VOLUME 77 [W. B. No. 1546] NUMBER 12

UNITED STATES DEPARTMENT OF COMMERCE
CHARLES SAWYER, *Secretary*
WEATHER BUREAU - - F. W. Reichelderfer, *Chief*

# MONTHLY WEATHER REVIEW

## DECEMBER 1949

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# MONTHLY WEATHER REVIEW

Editor, James E. Caskey, Jr.

VOL. 77, No. 12
W. B. No. 1546

DECEMBER 1949

CLOSED FEBRUARY 5, 1950
ISSUED MARCH 15, 1950

## NOTICE OF CHANGE IN MONTHLY WEATHER REVIEW

The monthly climatological data tables will no longer be carried in the MONTHLY WEATHER REVIEW, effective with the issue of January 1950. These tables together with additional climatic information will hereafter appear in "Climatological Data, National Summary" (price 15c per month or $1.50 per year). Paid subscribers to the MONTHLY WEATHER REVIEW will receive both publications until their present subscriptions expire.

Although the MONTHLY WEATHER REVIEW will no longer publish climatological data tables, it will continue to survey the weather of the month. The survey will consist of two monthly articles:

1. A discussion of the month's weather, including an interpretation of Charts I–XI in relation to the mean circulation patterns of the Northern Hemisphere.
2. A discussion of an outstanding weather situation of the month, including an analysis and interpretation of the meteorological features shown by synoptic weather charts.

In addition to reviewing the weather of the month, the MONTHLY WEATHER REVIEW will continue to publish contributions to meteorological science, particularly articles on synoptic and applied meteorology.

## THE WEATHER OF 1949 IN THE UNITED STATES

L. H. SEAMON

[Weather Bureau, Washington, D. C.]

The winter of 1948–49 was a period of marked weather extremes which reached peak intensity during the first 6 weeks of 1949. This was the coldest winter on record west of the Continental Divide and the most severe on record in the northern Great Plains and generally throughout the Rocky Mountain and Pacific States. On the other hand it was the third warmest in most sections east of the Mississippi River. Extremes of precipitation were greatest in the Midwest and Great Plains where many sections received 200 to 400 percent of normal for the season.

Temperatures rose rapidly in the West during the last half of February and by the end of the month had returned to normal levels. The spring season (March–May), which was warmer than normal in practically all sections of the country, favored rapid growth of vegetation and enabled weakened livestock in the West to recover fairly rapidly. Much above-normal precipitation in the Great Plains and lower Mississippi Valley was unfavorable to small grains and caused considerable delay in planting and cultivation.

Summer (June–August) was also warmer than usual in all sections, especially in the Lake Region and the New England and Middle Atlantic States where mean temperatures exceeded the normal by 4° to 6° F. Precipitation was below normal in the West, the northern Plains, and the Northeast but was generally normal or above in the southeastern quarter of the country. The cotton crop in the middle and eastern sections of the Main Belt suffered from lack of proper cultivation and from insect infestation due to prolonged intervals of rainy weather.

Autumn (September–November) was warmer than normal nearly everywhere in the United States, while only scattered sections received above-normal precipitation. This relatively warm, dry autumn was very favorable for the early maturity of most major crops and enabled harvesting operations to make rapid progress.

The number of severe local storms during May and June was one of the highest on record and total damage was very high, but these storms were relatively few during the other months. For detailed information on storms see articles on hurricanes and tornadoes elsewhere in this issue and tables of "Severe Storms" in each issue of the MONTHLY WEATHER REVIEW for 1949.

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Tabulations of monthly and annual temperature departure from normal, percentage of normal precipitation, and total precipitation are given by States in tables 1, 2, and 3 at the close of this article.

*January.*—January was characterized by marked extremes of weather in different portions of the country. The severe cold in the West and the unseasonable warmth in the East established a monthly mean temperature contrast between the two sections that has seldom been exceeded. Other outstanding features of this month's remarkable weather were record snowfall and snowcover in portions of the West, damaging freezes in Texas and the extreme Southwest, severe and frequent ice storms in central portions of the country, blizzards which set new records for frequency and intensity in the Great Plains and Rocky Mountains, and unseasonably heavy precipitation in central and southwestern portions of the country.

From the western Great Plains to the Pacific coast, monthly mean temperature departures were more than 5° below normal and as much as 18° to 20° below in the northern portion of the Great Basin, while nearly everywhere east of the Mississippi River plus departures exceeded 5° and were as much as 12° in the southern Appalachians.

This was the second coldest January on record west of the Continental Divide, only January 1937 being colder. However, January mean temperature of 6.9° for Idaho established a new low for that State, and numerous cities throughout the West also experienced their coldest January on record—among these are Missoula, Mont.; Boise, Idaho; Salt Lake City, Utah; Winnemucca, Nev.; Fresno, Los Angeles, Bakersfield, and San Diego, Calif. San Diego's record extends back to 1850. It was the second coldest January since 1865 at Prescott and Yuma, Ariz. New extreme low temperature records were established during January at several stations in southeastern Idaho and central Texas, and the extreme January low of −33° equaled the all-time record for Arizona. The −5° at Waco and Taylor, −2° at Austin, and 0° at San Antonio, Tex., were the lowest temperatures ever recorded at those stations.

Precipitation was much below normal in the extreme Northwest and Southeast. January totals were the lowest on record for Washington and Oregon and the lowest in 59 years for the southern half of Florida. Elsewhere the normals were exceeded, with most of the southwestern and central sections of the country receiving twice their usual amounts. The average January precipitation was the greatest of record in Kansas, Iowa, Oklahoma, South Dakota, and Nebraska, and the second greatest in Arizona, New Mexico, Illinois, and Arkansas. At many stations in eastern Nebraska 24-hour amounts of precipitation were the heaviest ever recorded in January.

Much of the precipitation west of the Mississippi was in the form of snow and the January average snowfall was the greatest of record in Louisiana, Texas, Kansas, Nebraska, the Dakotas, Wyoming, Utah, Arizona, and southern California, and the second greatest in Oklahoma and New Mexico. A January total of 77.4 inches at Deadwood in the Black Hills region was the greatest monthly snowfall ever officially measured in South Dakota. A number of stations in southern California, and most stations in southern Arizona, New Mexico, and Texas reported snowfall, some of them for the first time during periods of 75 to 100 years.

Snowfall in east-central Nevada, western Utah, western Nebraska, and north-central Arizona established new records for 24-hour amounts, monthly totals, and amounts for a single storm. Record depths on the ground were also measured due to a heavy snowcover already on the ground at the end of December. In north-central Arizona, snow depths were as much as 5 feet on the level, and the average snowfall for the state was 400 percent of normal. In east-central Nevada, Kimberly received 28 inches of snow during the month and the greatest depth on the ground was nearly 3 feet. The total January snowfall in western Utah ranged from 2 to over 4 feet and depths on the ground ranged up to 3 feet. In western Nebraska, 24-hour amounts ranged up to 3 feet; the monthly total at Agate exceeded 4 feet and the greatest depth on the ground was 40 inches.

High winds combined with frequent snows and persistent low temperatures created blizzard conditions during most of the month in the northern portion of the western plains and portions of the Rockies. The blizzard of January 2 to 5 was one of the most severe on record in these areas. At Rapid City, S. Dak., the average wind speed on the 3d and 4th exceeded 50 m. p. h., with extremes above 70 m. p. h. Temperatures remained below zero, and visibility was less than 5 feet the greater part of the two days. Fourteen inches of snow fell, with drifts 15 feet high at Rapid City, while railroad and highway cuts west of the city were filled to a depth of more than 20 feet.

Somewhat similar conditions which prevailed in western Nebraska on January 3 to 5 were described as the worst ever to visit that region, although temperatures were not quite as low as during some other storms. At North Platte the 24-hour wind speed averaged 41 m. p. h. on the 3d with gusts up to 65 m. p. h., and the day's snowfall totalled 8.8 inches.

The duration of blizzard conditions at Cheyenne, Wyo., was the greatest of record, and the storm of January 3 to 4 was the worst ever to occur in that state. Blizzard conditions prevailed most of the month in the Dakotas, although not of unusual severity in North Dakota.

This combination of wind, snow, and cold created the most adverse weather conditions in the history of the West. Livestock losses in Nevada, Utah, Wyoming, Colorado, western South Dakota, and Nebraska were very heavy. Losses in Wyoming alone were estimated at $9,000,000. Transportation was blocked during the greater part of the month in many areas and many communities were still snowbound at the end of the month. A hard crust formed on the snow in some sections and it was closely packed in others, both conditions making snow removal difficult. Also, the high winds often refilled the roads as soon as they were opened.

The severe cold damaged citrus and truck crops in southern California and Arizona to the extent of many million dollars, causing the greatest loss since the severe freeze of 1937. A freeze on the 30th, with minima in the 20's, caused considerable loss of citrus and vegetables in southern Texas.

The prolonged cold weather in northwestern areas also caused much damage. Fruit trees were cracked in the Willamette Valley of Oregon, electricity became short, frost penetration was unusually deep throughout the state, and many water mains froze. In western Montana several cities recorded zero minima on more than 20 days, resulting in a frost penetration of 7 feet or more and the freezing of thousands of water pipes. Ice was 36 inches thick in the upper Missouri, and Flathead Lake froze over for the 3d time since the 1880's.

In the Great Plains and Mississippi Valley interacting warm and cold air masses caused perhaps the greatest variety of weather conditions ever experienced in a single

month. Thunderstorms were reported as far north as Minnesota; tornadoes swept through Kansas, Louisiana, Mississippi, and Arkansas; hail fell in Missouri; ice storms occurred at intervals throughout the month; windstorms were numerous; and heavy rains caused considerable flooding.

Icing was especially severe in central Missouri, western Illinois, southeastern Kansas, southeastern New Mexico, and north-central Texas. These ice storms were the most severe ever known in parts of these regions, causing a number of deaths and many injuries, and many millions of dollars damage, as well as forcing many schools to close, disrupting communications, and delaying traffic. At the end of the month even the Southern States, including areas along the Gulf, experienced this phenomenon with the worst ice storm in Atlanta's history cutting off power for 6 hours.

On January 18 a heavy snowstorm occurred in the Great Plains that covered an extensive area in a remarkably short time. It moved 1,000 miles in 24 hours and covered a belt 150 to 200 miles wide with heavy snow, the latter figure probably representing the near-limit of a belt over which heavy snow can occur during a single storm. The snow cover at the end of the month was one of the most extensive on record, covering all of the country except narrow coastal belts in the extreme West and South and a small area in the Southeast. An extensive snow cover throughout the month protected small grains which were in good condition at the end of the month.

*February.*—In February the weather continued colder than usual in the West and northern Great Plains and warmer than normal in the lower Great Plains and East, with the average temperature departures ranging from minus 12° in the Rocky Mountain States to plus 10° along the central Atlantic coast. The distribution of precipitation was very irregular with greatest excesses occurring in the Southern States, the Ohio Valley, and the extreme Northwest, and the greatest deficiencies in the northern Great Plains and Southwest.

Severe cold weather continued to grip the West during the first half of the month. Vegetation was damaged in California's San Joaquin Valley where the number of days with below-freezing temperatures set new records and new February mean records were established at many stations. Crops were retarded throughout southern California and Arizona.

Frost penetrated to record depths in exposed places of Montana. Depths up to 8 feet were reported, with hardly a city in the State escaping serious difficulties from frozen water pipes. Water pipes also were damaged in several other western areas. Several cities resorted to water deliveries by truck.

Frequent light to heavy snows fell in the western Mountain and Pacific States, the averages for Oregon, Idaho, and Utah setting new records. Record depths on the ground were measured at stations in Nevada, Idaho, Utah, and in the Cascades. The heavy snows were drifted by high winds, blocking rail and highway transportation and isolating several communities. Most roads leading to stranded herds of livestock had been opened by the beginning of the month, but it was a continuous struggle to keep them open due to the high winds continually redrifting the roads. Many livestock that were saved were further weakened by the persistent cold. The critical areas were western South Dakota, western Nebraska, eastern Wyoming, northeastern Colorado, western Utah, eastern Nevada, northern Arizona, and a few adjacent areas.

An unusually severe blizzard on the 16th and 17th occurred in Montana along the eastern slope of the Continental Divide. High winds, with gusts up to 90 m. p. h., damaged roofs and windows and blew a car off the road near Sweetgrass.

A rising temperature trend prevailed in the West after the middle of the month, although temperatures in most sections averaged below normal during the third week. During the last week above-normal temperatures prevailed throughout the West, and the snowcover at lower elevations melted.

The entire month was abnormally warm in the East. Cold waves near the beginning and end of the month brought freezes to the deep South but were not severe enough to cause serious damage. Snowfall was generally below normal east of the Mississippi River.

Livestock in the critical areas of the West made rapid improvement during the last half of the month, although some were still in a weakened condition. Small grains came through the month in mostly good condition, due to a protecting snowcover during the period of extreme cold. Dry, hot weather injured non-irrigated citrus in southern Florida.

*March.*—In contrast to the preceding 2 months, March weather conditions were nearly seasonal. Temperatures averaged near normal, except in some sections of the Northeast where plus departures exceeded 6°. Precipitation was unevenly distributed and monthly totals were generally above normal, although there were slight deficiencies in many sections west of the Continental Divide, in a narrow belt along the Southwestern Border, and in the Atlantic Coastal States.

During the first week in the Southern States below-normal temperatures and frosts retarded crop growth and caused some local damage to advanced fruit. Generally the weather was seasonably mild and dry in the remainder of the country. In western areas warm days and below-freezing temperatures at night caused a gradual melting of the heavy snowcover, thus reducing the flood potential. Floods resulting from ice jams washed out several bridges in Montana, Iowa, Nebraska, and Kansas. New England received its heaviest snowstorm of the season on the 1st.

The 2d and 3d weeks were cold and stormy in central and southeastern areas with truck crops and advanced fruit buds suffering some damage in the latter areas. On the 10th, Ohio received its heaviest snowstorm of the season, 4 to 10 inches. From a general snowstorm over the northeastern quarter of the country on the 17th and 18th, most stations in Michigan, New York, and New England received 2 to 6 inches of snow but most of this soon melted. Light snows in the northern Great Plains and heavy snows in Colorado, Wyoming, and Montana were frequent during the period.

East of the Mississippi River the last 10 days were unseasonably warm, temperatures averaging as much as 15° above normal along the central Atlantic coast. Maximum temperatures, which are normally in the 50's during this period, rose to 80° F. at many stations on the 27th. Ice and snow had mostly disappeared in New England by the end of the month, and vegetation was 2 to 3 weeks ahead of normal development throughout the East.

The last decade was generally cold and stormy in the Central and Rocky Mountain States. A depression of storm intensity crossed the central interior on the 25th and 26th. During its passage heavy snows fell in the central Rocky Mountain and North Central States, heavy rains and thunderstorms occurred in the Mississippi Valley, and a number of severe tornadoes left paths of

destruction in scattered sections of the lower Great Plains and the lower Mississippi Valley.

Similar conditions accompanied the passage of a second depression across this region during the closing days of the month. Heavy rains fell over central Gulf areas, with 24-hour amounts exceeding 4 inches at many stations.

A snowstorm in Nebraska on the 29th and 30th was described as one of the most severe on record in southwestern and north-central portions. Total snowfall ranged from 12 to 28 inches in the southwestern part and up to 15 inches in north-central localities. Damage to communications and losses of livestock caused by high winds and heavy drifting snow amounted to nearly $300,000 in this State. On the 30th a tornado caused 4 deaths, more than a score of injuries, and over a million dollars property damage in northwestern Oklahoma. Extremely heavy rainfall was reported from points along its path, with estimated amounts ranging up to 10 inches in less than an hour.

*April.*—April was relatively warm and dry. Temperatures generally averaged somewhat below normal in the southeastern quarter of the country but above normal elsewhere with plus departures as much as 6° to 8° in the central Rocky Mountain region and in extreme north-central areas. Total precipitation was above normal only in Pennsylvania, New Mexico, and the Gulf and Atlantic Coastal States.

The first few days of the month were cold and stormy in the Great Plains and southern Rocky Mountain States. Heavy snows blocked roads in Colorado and Minnesota and damaged power and communication lines in the latter State. A new all-time low April temperature for Arizona was established on the 2d when Maverick recorded −8° F.

A coastal storm caused winds of gale intensity in southern New England on the 6th, resulting in considerable damage to overhead wires and small buildings on land and a number of small boats along the coast. From the 13th to the 15th a storm, accompanied by high winds and light to heavy precipitation, moved from the lower Great Plains to New England. In north-central areas snowfall up to 8 inches or more was blown into drifts 3 to 4 feet high in portions of Iowa, southern Minnesota, and eastern Nebraska. A cold air mass, which overspread the eastern half of the country in the wake of this storm, brought below-freezing temperatures and frost to the northern portions of the Southern States on the 17th. This freeze was reported as one of the latest damaging freezes on record in South Carolina.

Except in Texas and the Southeast where it was too rainy, weather conditions during the last 10 days were favorable for agricultural activities, crop growth, and livestock. The most damaging flood of the month occurred in southern Texas between Rio Grande City and Laredo, where 5 to 10 inches of rain fell from the 23d to the 25th. Damage was estimated at $2,700,000 to cotton and $600,000 to tomatoes. Much greater damage was averted due to timely warnings. A flash flood caused $2,000,000 damage at Herington, Kans., on the 30th.

Total storm damage for April was less than usual. On the 19th a hailstorm in the vicinity of Del Rio, Tex., caused $1,525,000 damage. Fourteen tornadoes occurred in Oklahoma on the 30th, causing 6 deaths, 71 injuries, and $1,590,000 damage. This is a greater number than ever previously reported for any month in Oklahoma. The first tornado ever officially reported in Nevada occurred a few miles north of Reno on the 18th.

*May.*—In May temperatures were slightly above normal over the entire country, with departures exceeding 5° at only a few stations in extreme north-central areas. The first 10 days were unusually warm east of the Rocky Mountains, especially in the northeastern quarter where temperatures averaged 10° to 15° above normal. New record high temperatures were established at many stations in the Lake Region on the 3d when temperatures rose to over 95° F. The last week was cold in the eastern third of the country, and late-season frosts occurred in north-central areas and in the Northeast as far south as Maryland.

Precipitation was much above normal in portions of the central and lower Great Plains, along the central Atlantic coast, and in some sections of the extreme Southwest; but was considerably below normal in Washington, Florida, southern Texas, and in a considerable area immediately west of Lake Michigan. The locally heavy rains in central sections resulted in several damaging floods. Fort Worth, Tex., experienced its worst flood in history as a result of a heavy rain that measured up to 10 inches in 24 hours on the 16th and 17th; damage was estimated at $6,000,000. Total rain and flood losses in Kansas and Nebraska were estimated at nearly $300,000. Heavy rainfall in northwestern Minnesota on the 29th that measured 7.50 inches in 6 hours at Thief River Falls caused damage estimated at $361,000.

This May was outstanding for the great number of severe local storms with at least one being reported for every day in the month. From the 20th through the 22d during the passage of a major depression over the central portion of the country, these storms averaged more than 30 per day. Total damage by the different types of storms was as follows: tornado, over $18,000,000; wind, nearly $5,000,000; hail, over $20,000,000; electrical, slightly over $200,000. The month's storm losses in Oklahoma, Kansas, and Texas totaled over $8,000,000 in each State, and over $5,000,000 in Nebraska, and about $6,000,000 in Missouri. The two most destructive tornadoes caused $4,779,000 damage at Amarillo, Tex., on the 15th, and $4,000,000 damage at Cape Girardeau, Mo. on the 21st, with 29 deaths and 213 injuries. Individual hailstorms which caused over $1,000,000 damage each were reported from Kansas on the 18th, Chase County, Nebr., on the 19th and 23d, Oklahoma on the 20th and 31st, Texas on the 27th, and Kansas on the 23d. In the storm in Kansas on the 18th, some hailstones as large as baseballs were reported. Total storm damage for the month was estimated at over $50,000,000.

*June.*—The outstanding feature of the weather in June was the combination of drought and high temperatures in the Northeast. June was the driest month in New Jersey since records began in 1866. It was the driest June on record in Pennsylvania and the second driest in New York and southern New England. Many stations in eastern Massachusetts, several on Long Island, and scattered stations in New Jersey received not even a trace of rain during the month. It was the hottest June on record in New York and the hottest in New England since 1913.

Truck crops suffered heavily, especially in New Jersey and deteriorating pastures caused a reduction in dairy production. Fruit also deteriorated in southeastern New York and southern New England. In New Jersey, the reduction in yields of sweetcorn and potatoes was estimated at 50 percent. The forest fire hazard was great, and although some fires broke out in New England, they were effectively controlled without serious damage.

In other sections of the country temperatures averaged slightly higher than normal. Precipitation was also much below normal in the far West and some north-central

sections, but heavier than usual in much of Arizona, Colorado, and scattered areas of the central interior and Southeast. The month's average precipitation for Colorado was the highest on record.

Several damaging floods occurred in the areas of heavy rainfall. Total flood damage for the two States of Kansas and Nebraska totaled between 1 and 2 million dollars. One of the worst flash floods in several years occurred in the Virginia-West Virginia border area on the 17th–18th, when the south branch of the Potomac in West Virginia and the upper reaches of the Shenandoah River in Virginia overflowed as a result of torrential rains which exceeded 12 inches in 24 hours at some stations. The Petersburg-Moorefield area in West Virginia and the Stokesville-Bridgewater area in Virginia suffered most. A dozen or more lives were lost and 2,400 people driven from their homes. The total damage was estimated at more than $9,000,000.

Heavy rains in western North Carolina from the 14th to the 16th caused flash floods along several streams, resulting in damage estimated at nearly $2,000,000. Two new rainfall records were set at Hatteras, N. C. during the month—14.73 inches on the 30th established a new 24-hour record and a monthly total of 20.95 set a new all-time high at that station for any month.

In Scott, Clark, and Washington Counties, Ind., 6-hour rains up to 8 to 9 inches on the 15th caused flash floods which resulted in $100,000 damage. And again on the 26th, over 6 inches of rain in less than 3 hours resulted in flood damage of about $500,000 in this state. A flash flood in the Lamar-Holly-Bristol area of Colorado on the 4th–5th caused $2,000,000 damage.

Severe local storm damage was heavy in the Great Plains, but generally less than usual in other areas. Total damage for the entire country exceeded $10,000,000. Of the three individual storms causing damage of a million dollars or more each, two were reported from Kansas and one from Colorado. Total storm damage in Kansas was estimated at $3,621,000.

Frost caused minor damage in portions of the Great Basin. On the 8th and 9th slight damage resulted from frost which occurred in sections of the Lake Region and Northeast. An extraordinary late-season snowstorm occurred a few miles southwest of Helena, Mont., on the 16th, with 30 inches falling at Chessman Reservoir in 12 hours.

*July.*—Except for a relatively small section in the extreme Northwest, July was warmer than normal, especially in the Lake Region and Northeast where mean temperatures exceeded the normals by 6° or more. This was the hottest July on record in New Jersey and Maryland, the second hottest in New England, and the third hottest in West Virginia and Pennsylvania. This period of intense heat, which began about the middle of June, was one of the longest on record.

During a cool period at the beginning of the month in the Northwest frost caused minor damage to vegetables in eastern Washington. Some snow fell on higher peaks and frost occurred at higher elevations during a second cool period near the close of the month.

Precipitation was irregularly distributed but was below normal in several Western States and the Northeast, particularly New York, New England, and New Jersey. In the Northeast the lack of rain along with the intense heat was very detrimental to crops, especially vegetables, and pastures; ground water levels declined; and the forest fire hazard became acute. In other sections of the country precipitation was normal or above, the greatest excesses being measured in the agricultural regions of the Midwest and South.

Damage resulting from severe local storms was unusually low and only a few tornadoes were reported. Tornado damage estimated at $1,000,000 occurred in Union County, S. Dak., on the evening of the 31st. North Dakota was the scene of the month's most destructive hailstorm, which caused property damage exceeding $1,000,000 in the northern part of Bismarck, and extensive crop damage in surrounding communities. The stones in this hailstorm, which was described as Bismarck's worst in 25 years, measured up to 2½ inches in diameter and, driven by strong winds, chipped paint from houses. A thunderstorm accompanied by severe lightning, heavy hail, and high winds caused about $5,000,000 damage in southern New England. Total storm damage for the month exceeded $11,000,000.

*August.*—August was generally a warm, dry month. Only in Florida, Georgia, Arizona, the lower Great Plains, and some interior sections of the Pacific States did temperatures average below normal, and minus departures were generally under 2°. Monthly means were slightly above normal in the remainder of the country, although plus departures exceeded 6° at a few stations in the extreme northern portion of the Great Plains. Arizona's below-normal temperature average was mainly due to unusually cool nights from the 10th to the 20th. Early season frosts occurred at higher elevations, causing some damage to the bean crop in the Flagstaff area on the 17th.

Precipitation totals were above normal only at scattered stations in central areas, in the western portion of the Middle Atlantic States, and along the Atlantic coast from Virginia southward. Much of the Far West was extremely dry. Nevada received only 1 percent of its normal precipitation and many sections in other States received less than 25 percent. Most of the above normal precipitation along the East Coast fell from the 26th to the 29th.

Most of the month's storm damage resulted from the Florida hurricane which swept northward to New England. Damage in Florida was estimated at $45,000,000, and a total of several million dollars more damage occurred along the path north of Florida. A million-dollar flash flood occurred on the 11th in the Moline-Rock Island vicinity of Illinois when 7 inches of rain fell in less than 24 hours.

The dry, hot weather in sections of the Northeast during June and July continued during the first half of August. Crops were further parched, many minor forest fires broke out, and the water level further declined in this region. The surface effects of the drought were broken by rains during the latter part of the month, but ground water levels remained low.

*September.*—Monthly mean temperatures in September averaged above normal in the Mountain and Pacific States, southern Texas, Florida, and northern Maine, with plus departures exceeding 6° at most stations in the central portion of the Great Plains. Below normal means in the remainder of the country showed minus departures of more than 6° at a number of stations in the Midwest.

The frequent penetration of cold Canadian air masses into the eastern half of the country resulted in the coolest September in that region in many years. Mean temperatures in several States in the Midwest were the lowest since 1918. Killing frosts were 1 to 2 weeks earlier than usual in the North Central States, but due to the early

maturity of most major crops only minor damage resulted.

In spite of the above-normal monthly mean temperatures in the Mountain and Pacific States, frosts were a week to 10 days earlier than usual in most central and northern districts of this region, where some damage occurred. The first week was hot in the Great Basin with Winnemucca, Nev., recording a new record high temperature of 98° F. on the 1st. The last week of the month was also extremely warm in the Great Basin where weekly means exceeded the normal by 12° at a number of stations. On the 12th the temperature dropped 35° in an hour at Boise City, Okla., during the passage of a cold front.

Precipitation was below normal for the nation as a whole, and very unevenly distributed. Areas with above-normal precipitation included a section along the lower portion of the Continental Divide, southern portions of the eastern Great Plains, an area along the central Gulf coast, Florida, western New York, and eastern New England. Precipitation in these areas generally occurred as brief showers during the first half of the month, resulting in more fair weather than usual. The number of severe storms was unusually low. On the 24th and 25th the Airport at Jacksonville, Fla., reported 10.13 inches of rain in 24 hours which flooded streets and caused some minor damage.

*October.*—In October monthly mean temperatures varied only slightly from the normal in the Great Plains and Far West, but plus departures exceeded 6° in some sections east of the Mississippi River. Except for a warm period in the Southwest during the third week, cooler than normal weather predominated in the western States until the closing days of the month. During the first decade, killing frosts occurred in many interior sections west of the Continental Divide as far south as northern Arizona where the bean crop was damaged slightly.

The West's lowest temperatures of the month were experienced from about the 18th to the 21st when a cold Canadian air mass overspread the entire region and subsequently the entire country. It began its invasion in Montana with the season's earliest blizzard occurring along the northern portion of the Divide where minimum temperatures below 10° F., high winds, and drifting snow blocked roads and caused three deaths. During this period killing frost ended the growing season in the agricultural valleys of western Oregon several weeks earlier than usual and the growing season was ended in most other interior sections of the West that escaped killing frosts during the first week of the month.

Above-normal temperatures which prevailed east of the Great Plains during the first 3 weeks reached record values at some stations. Rochester, N. Y., reported its highest October temperature of record, 89°, on the 10th. On the 27th a cold Canadian air mass overspread this region reducing temperatures to seasonal levels and bringing the season's first general killing frost to the northern half. Many northern stations reported their first snowfall of the season during the last 10 days of the month.

A tropical disturbance moved inland near Houston, Tex., on the 4th, its center moving in a path across southeastern Texas, northwestern Louisiana, eastern Arkansas, southeastern Missouri, western Illinois, southeastern

TABLE 1.—*Monthly and annual temperature departures from the normal (°F.), 1949*

| State | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 7.7 | 4.9 | −2.1 | −1.2 | 1.6 | −0.3 | 0.5 | −0.1 | −3.2 | 5.4 | −1.4 | 2.3 | 1.2 |
| Arizona | −8.3 | −5.3 | −1.3 | 1.8 | −.5 | −.2 | −.4 | −.6 | 2.5 | −2.2 | 5.4 | −1.2 | −.9 |
| Arkansas | 0.9 | 2.4 | −1.6 | −1.6 | 2.2 | .8 | .6 | −2.4 | −5.1 | .0 | 1.0 | 2.1 | −.1 |
| California | −0.7 | −5.3 | −2.8 | 2.8 | −.7 | 1.4 | −1.3 | −2.5 | 1.9 | −1.9 | 4.5 | −2.3 | −1.3 |
| Colorado | −7.8 | −3.3 | 1.0 | 1.6 | 1.0 | −.6 | .4 | .3 | 1.0 | −1.2 | −8.7 | 1.1 | .2 |
| Florida | 5.7 | 7.2 | −.2 | 1.3 | .9 | −.1 | .3 | −.2 | 1.4 | 3.8 | −2.9 | 3.6 | 1.7 |
| Georgia | 8.5 | 7.0 | −.8 | −1.6 | .5 | −1.3 | .4 | −.7 | −2.2 | 4.6 | −2.3 | 2.2 | 1.2 |
| Idaho | −16.8 | −4.5 | 1.1 | 3.3 | 3.3 | .0 | −.6 | 1.5 | 2.7 | −4.9 | 5.6 | .0 | −.8 |
| Illinois | 2.6 | 2.0 | .1 | −.9 | 2.4 | 2.5 | 2.0 | .0 | −6.1 | 2.9 | 1.8 | 4.5 | 1.2 |
| Indiana | 5.6 | 4.1 | .5 | −1.3 | 1.4 | 2.1 | 2.8 | .1 | −6.1 | 4.0 | .2 | 3.5 | 1.4 |
| Iowa | −1.6 | −3.0 | −1.2 | .4 | 3.1 | 2.9 | 1.3 | .4 | −5.2 | 3.0 | 4.3 | 2.7 | .6 |
| Kansas | −7.2 | −1.4 | −.5 | −.6 | 2.1 | .9 | .0 | −2.1 | −4.4 | .8 | 5.8 | 1.3 | −.4 |
| Kentucky | 8.0 | 5.9 | −.7 | −2.4 | 1.0 | .9 | 2.5 | −.5 | −5.8 | 3.3 | −1.1 | 3.1 | 1.2 |
| Louisiana | 3.7 | 3.3 | −1.4 | −2.1 | 2.0 | .6 | .2 | −1.1 | −1.1 | 2.8 | −.7 | 2.8 | .7 |
| Maryland-Delaware | 8.2 | 8.0 | 1.9 | .4 | .5 | 1.9 | 3.5 | 1.3 | −3.0 | 4.5 | .4 | 3.5 | 2.7 |
| Michigan | 5.2 | 4.5 | .9 | 1.5 | 2.0 | 4.3 | 2.3 | 1.9 | −3.3 | 4.5 | −.9 | 2.7 | 2.1 |
| Minnesota | −.2 | −4.5 | −2.5 | 1.9 | 2.5 | 2.3 | 1.2 | 3.0 | −3.2 | 1.4 | 4.7 | −1.1 | .5 |
| Mississippi | 6.4 | 3.5 | −1.3 | −1.6 | 1.9 | .3 | .4 | −.9 | −1.9 | 3.6 | −.4 | 3.1 | 1.1 |
| Missouri | .0 | 1.9 | −.4 | −1.1 | 3.1 | 1.6 | .8 | −1.5 | −6.3 | 1.4 | 3.1 | 3.8 | .5 |
| Montana | −14.6 | −7.8 | −1.8 | 5.3 | 3.5 | .2 | −.9 | 3.0 | .2 | −4.3 | 9.8 | −5.2 | −1.0 |
| Nebraska | −10.6 | −4.0 | −.7 | 1.2 | 2.8 | .8 | .6 | .0 | −3.3 | .3 | 8.1 | 1.3 | −.2 |
| Nevada | −14.9 | −6.8 | −.2 | 4.7 | .9 | 1.2 | −.3 | −.3 | 3.5 | −1.7 | 7.1 | −.6 | −.8 |
| New England | 5.8 | 4.6 | 1.3 | 2.6 | 2.7 | 3.8 | 3.3 | 2.5 | −1.7 | 3.9 | −1.4 | 3.2 | 2.6 |
| New Jersey | 7.2 | 7.3 | 2.9 | 2.0 | .8 | 3.0 | 4.1 | 2.7 | −2.2 | 5.2 | −.1 | 3.5 | 3.1 |
| New Mexico | −5.2 | −1.2 | 1.7 | .2 | 1.1 | 1.3 | .6 | .2 | 1.2 | −1.8 | 5.3 | −1.5 | −.5 |
| New York | 5.7 | 6.6 | 1.4 | 1.3 | .8 | 4.9 | 3.5 | 2.7 | −2.7 | 4.6 | −1.9 | 3.2 | 2.6 |
| North Carolina | 8.7 | 7.0 | .9 | .0 | .7 | .8 | 3.1 | .7 | −2.1 | 4.4 | −.7 | 2.7 | 2.2 |
| North Dakota | −5.3 | −7.5 | −1.9 | 5.6 | 2.1 | .9 | .5 | 4.5 | −1.2 | −.7 | 10.3 | −4.6 | .2 |
| Ohio | 8.0 | 7.0 | 1.8 | −1.0 | 2.0 | 3.8 | 3.8 | 1.5 | −4.8 | 5.3 | .8 | 3.9 | 2.7 |
| Oklahoma | −6.6 | −.8 | −1.3 | −1.6 | 1.9 | .7 | .6 | −3.0 | −4.7 | −.8 | 3.3 | 1.5 | −.9 |
| Oregon | −12.9 | −2.5 | −.5 | 2.9 | 3.4 | .4 | −1.5 | −.5 | 1.8 | −4.7 | 4.7 | −.5 | −1.0 |
| Pennsylvania | 7.0 | 6.8 | 1.2 | −.4 | .4 | 2.5 | 3.3 | 1.2 | −4.2 | 4.3 | −.8 | 2.4 | 2.0 |
| South Carolina | 8.3 | 6.3 | .0 | −1.4 | .0 | −.7 | .9 | −.3 | −2.6 | 3.6 | −1.9 | 1.1 | 1.1 |
| South Dakota | −9.1 | −5.6 | −1.3 | 3.1 | 3.5 | 1.4 | 1.8 | 2.9 | −3.3 | −.6 | 9.3 | −2.7 | −.1 |
| Tennessee | 7.4 | 4.5 | −.9 | −2.3 | 1.4 | .7 | 1.7 | −.8 | −4.5 | 4.2 | −1.0 | 2.9 | 1.1 |
| Texas | −7.1 | −.3 | −.9 | −3.7 | 1.2 | −.4 | −.4 | −2.6 | −1.5 | −1.7 | 1.4 | 1.2 | −1.3 |
| Utah | −12.7 | −9.3 | .0 | 4.3 | 1.2 | −1.3 | −.4 | .1 | 2.4 | −2.7 | 6.0 | −.9 | −1.1 |
| Virginia | 7.7 | 7.0 | .1 | −.8 | −.1 | .9 | 2.5 | .2 | −3.5 | 3.7 | −.3 | 2.5 | 1.7 |
| Washington | −13.0 | −5.2 | −.6 | 1.2 | 2.8 | −.6 | −1.6 | −.5 | 2.0 | −4.2 | 4.3 | −1.3 | −1.4 |
| West Virginia | 9.3 | 7.8 | −.1 | −1.1 | 1.1 | 1.8 | 3.7 | .8 | −4.5 | 5.1 | −1.1 | 3.2 | 2.2 |
| Wisconsin | 3.6 | .8 | .2 | 1.4 | 2.7 | 4.0 | 2.5 | 2.3 | −4.0 | 3.7 | 2.0 | 1.9 | 1.8 |
| Wyoming | −12.5 | 4.0 | 1.3 | 5.1 | 2.5 | .0 | .6 | 2.4 | 1.0 | −3.6 | 8.9 | .0 | .7 |

Wisconsin, and northern Lower Michigan. The intense winds and rainfall caused heavy damage to rice and moderate damage to cotton and property in Texas, and some damage to cotton and rice in Louisiana and Arkansas. Property damage in southeastern Texas was estimated at $400,000.

On October 10th occurred one of the most damaging storms ever to visit the northern Great Plains. Moving into the central Great Plains as a minor depression on the night of October 9, it gained great intensity over western Nebraska, and during the 10th the center of the storm moved from this location northeastward across South Dakota, southeastern North Dakota, and extreme northwestern Minnesota. Huron, S. Dak., near the center of the storm, recorded its lowest pressure on record. Damaging winds were reported in Iowa, western Michigan, and Wisconsin, as well as in the states crossed by the storm's center. At many points, wind velocities averaged 50 to 65 m. p. h. for a period of 3½ hours. Gusts reached 70 to 100 m. p. h. over a large area. Damage by states was: Nebraska, $1,000,000; South Dakota, $500,000; Minnesota, $2,500,000. Damage based on an estimated settlement of insurance claims in Iowa indicated a loss of at least $3,000,000, but the total was probably much greater. No estimate of damage is available for Michigan and North Dakota.

Precipitation was below normal in Florida, the Northeast, the Lake Region, and west of the Continental Divide; elsewhere, it was above normal with greatest excesses being recorded in the South Central States. The heaviest precipitation of the month occurred along the path of the tropical disturbance of October 3–5, its path extending from east Texas to the Lake Region. Twenty-four-hour rainfall totals ranged from 2 to 7 inches in Texas and the lower Mississippi Valley and from 1 to 2 inches in the upper Mississippi Valley and the Lake Region.

Even though some sections received generous rains, there was generally much sunny weather which permitted harvesting activities to make good to excellent progress. With adequate soil moisture in most areas small grains were generally in good condition at the end of the month, especially in the Great Plains belt where growth was very good to excellent and progress above normal.

*November.*—This was the second warmest and sixth driest November in the United States during the last 57 years. Temperatures were almost continuously above normal west of the Mississippi River where plus departures generally exceeded 4° and ranged from 8° to more than 14° in the northern Great Plains. East of the Mississippi monthly mean temperatures generally averaged within 2° of normal. State averages show this November to be the warmest on record in Washington, Nevada, Montana, Wyoming, Utah, Colorado, New Mexico, Nebraska, and the Dakotas, and to equal the record for Oregon. The former record for Colorado was exceeded by more than 3°. This was the second warmest November on record in Kansas, California, Idaho, and the third warmest in Arizona.

Scattered stations throughout the western and north-central portions of the country registered new maximum

TABLE 2.—*Percentage of normal precipitation, 1949*

| State | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 130 | 117 | 101 | 125 | 103 | 135 | 121 | 98 | 101 | 116 | 25 | 76 | 106 |
| Arizona | 239 | 58 | 47 | 58 | 91 | 247 | 95 | 56 | 123 | 129 | 34 | 95 | 97 |
| Arkansas | 234 | 112 | 114 | 55 | 105 | 125 | 117 | 88 | 97 | 262 | 10 | 112 | 117 |
| California | 58 | 69 | 147 | 10 | 135 | 19 | 18 | 59 | 22 | 25 | 82 | 53 | 70 |
| Colorado | 190 | 59 | 114 | 63 | 132 | 226 | 102 | 67 | 63 | 103 | 30 | 62 | 102 |
| Florida | 32 | 88 | 66 | 171 | 60 | 112 | 105 | 136 | 112 | 90 | 84 | 86 | 102 |
| Georgia | 70 | 116 | 59 | 149 | 102 | 114 | 96 | 128 | 86 | 113 | 40 | 61 | 96 |
| Idaho | 50 | 169 | 61 | 39 | 127 | 49 | 49 | 60 | 90 | 108 | 96 | 88 | 86 |
| Illinois | 260 | 136 | 100 | 50 | 67 | 104 | 136 | 86 | 76 | 194 | 26 | 220 | 113 |
| Indiana | 255 | 119 | 101 | 56 | 82 | 135 | 105 | 110 | 80 | 176 | 37 | 154 | 115 |
| Iowa | 269 | 80 | 144 | 51 | 103 | 121 | 96 | 62 | 80 | 84 | 28 | 98 | 89 |
| Kansas | 461 | 118 | 135 | 83 | 143 | 148 | 123 | 87 | 80 | 126 | 12 | 101 | 120 |
| Kentucky | 157 | 154 | 109 | 88 | 70 | 132 | 99 | 123 | 64 | 170 | 53 | 150 | 114 |
| Louisiana | 122 | 106 | 165 | 139 | 50 | 110 | 132 | 79 | 97 | 223 | 8 | 94 | 109 |
| Maryland-Delaware | 162 | 118 | 79 | 79 | 130 | 51 | 106 | 96 | 98 | 117 | 63 | 72 | 97 |
| Michigan | 138 | 123 | 98 | 68 | 84 | 132 | 147 | 85 | 82 | 94 | 90 | 144 | 103 |
| Minnesota | 207 | 54 | 140 | 35 | 101 | 99 | 188 | 61 | 61 | 175 | 79 | 134 | 106 |
| Mississippi | 167 | 105 | 142 | 104 | 109 | 132 | 125 | 94 | 122 | 184 | 10 | 80 | 114 |
| Missouri | 276 | 123 | 105 | 41 | 96 | 136 | 139 | 80 | 120 | 207 | 16 | 168 | 119 |
| Montana | 112 | 151 | 89 | 51 | 91 | 62 | 86 | 50 | 76 | 133 | 56 | 114 | 83 |
| Nebraska | 352 | 41 | 220 | 63 | 142 | 130 | 77 | 102 | 104 | 116 | 22 | 43 | 112 |
| Nevada | 124 | 85 | 89 | 30 | 227 | 64 | 67 | 56 | 64 | 62 | 81 | 50 | 89 |
| New England | 119 | 94 | 62 | 104 | 108 | 48 | 73 | 77 | 114 | 67 | 87 | 76 | 86 |
| New Jersey | 165 | 106 | 68 | 103 | 132 | 6 | 82 | 76 | 113 | 69 | 49 | 83 | 87 |
| New Mexico | 278 | 91 | 59 | 107 | 98 | 179 | 133 | 68 | 132 | 63 | 11 | 73 | 107 |
| New York | 121 | 91 | 64 | 110 | 88 | 40 | 83 | 116 | 104 | 54 | 88 | 93 | 87 |
| North Carolina | 75 | 94 | 70 | 125 | 116 | 127 | 111 | 171 | 97 | 128 | 102 | 61 | 109 |
| North Dakota | 238 | 98 | 77 | 32 | 104 | 75 | 145 | 48 | 37 | 248 | 49 | 135 | 95 |
| Ohio | 186 | 104 | 84 | 83 | 81 | 107 | 111 | 98 | 93 | 67 | 55 | 110 | 99 |
| Oklahoma | 363 | 149 | 105 | 59 | 165 | 125 | 98 | 69 | 123 | 121 | 6 | 96 | 118 |
| Oregon | 28 | 179 | 82 | 40 | 135 | 38 | 50 | 32 | 87 | 85 | 99 | 84 | 80 |
| Pennsylvania | 142 | 94 | 57 | 105 | 94 | 46 | 128 | 89 | 93 | 71 | 61 | 105 | 91 |
| South Carolina | 62 | 122 | 54 | 134 | 97 | 91 | 85 | 172 | 95 | 121 | 97 | 55 | 102 |
| South Dakota | 275 | 25 | 110 | 57 | 91 | 56 | 83 | 91 | 101 | 178 | 36 | 127 | 90 |
| Tennessee | 172 | 76 | 104 | 95 | 90 | 165 | 131 | 108 | 63 | 232 | 34 | 114 | 115 |
| Texas | 200 | 133 | 89 | 136 | 88 | 108 | 114 | 98 | 94 | 207 | 6 | 103 | 114 |
| Utah | 185 | 75 | 110 | 46 | 178 | 216 | 72 | 49 | 75 | 160 | 63 | 164 | 111 |
| Virginia | 115 | 88 | 73 | 107 | 126 | 113 | 124 | 156 | 88 | 114 | 80 | 71 | 108 |
| Washington | 23 | 164 | 77 | 54 | 57 | 44 | 97 | 80 | 75 | 98 | 116 | 98 | 87 |
| West Virginia | 136 | 103 | 64 | 100 | 94 | 131 | 116 | 106 | 88 | 106 | 95 | 117 | 105 |
| Wisconsin | 155 | 68 | 134 | 66 | 63 | 119 | 161 | 66 | 55 | 76 | 63 | 99 | 92 |
| Wyoming | 153 | 81 | 88 | 57 | 130 | 123 | 73 | 51 | 75 | 164 | 46 | 91 | 96 |

temperature records. Record maxima for November 2 were recorded at many stations in Washington and Oregon, and the 83° F. registered at Kosmos, Wash., on that date was the highest temperature ever recorded in the State during November. On November 11 maximum temperatures recorded at many stations in the Lake Region and Ohio Valley established new records for that date and for so late in the season.

The second week was abnormally warm throughout the country but principally in the northeastern quarter where weekly plus departures exceeded 15° at a number of stations. Chinook winds produced abnormally high temperatures in the northern portion of the western Great Plains during the last week of the month, with temperatures occasionally exceeding the normals by 20° to 35°. Weekly means exceeded the normal by as much as 19° and at some stations were the highest on record for that time of year.

Except for a few stations along the Atlantic coast and in the extreme Northwest, precipitation was generally much below normal, especially in the area between the Appalachian and Rocky Mountains where the percentage of normal for the month generally amounted to less than 25 percent. This was the driest November on record for Texas, Arkansas, Mississippi, and Louisiana. At many stations in these States and scattered stations throughout the Great Plains the month's precipitation amounted to only a trace or was entirely lacking.

During the third week snowfall was general over the northeastern quarter of the country with locally heavy amounts along the shores of Lake Erie that measured 9 inches at Cleveland, Ohio, and 12 inches at Buffalo, N. Y. By the end of the month a snowcover ranging up to 10 inches in depth covered Michigan, northern Wisconsin, and Minnesota, and all of New England except coastal areas.

With warm, dry weather during most of the month, harvests were completed and other fall work made good progress. Fall grains were in good condition but needed rain at the end of the month. Crops were in poor condition only in Louisiana and Mississippi where deficient rainfall had persisted since the middle of October.

A destructive windstorm struck the Northwest on the 26th and 27th, causing damage estimated at $300,000 in Washington, $500,000 in Idaho, $50,000 in Montana, and $45,000 in Wyoming. Measured wind speeds at a number of stations indicated that speeds of 60 to 80 m. p. h. with gusts over 90 were general over most of the Northwest. At Cut Bank, Mont., 90 m.p.h. winds were measured and gusts were estimated at 105 m. p. h. Floods in the Skagit and other rivers of western Washington, resulting from heavy rains that accompanied this storm, caused damage estimated at $500,000.

*December.*—The abnormally warm, dry weather of November continued through the first decade of December. Weekly means ranged from 9° to 15° above normal in the northern Great Plains and the only important precipitation fell in the coastal areas of Washington, Texas, and New England.

TABLE 3.—*Monthly and annual precipitation amounts (inches), 1949*

| State | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 6.58 | 6.20 | 6.16 | 5.79 | 4.07 | 5.76 | 6.71 | 4.61 | 3.31 | 3.37 | 0.80 | 4.01 | 57.37 |
| Arizona | 3.06 | .76 | .51 | .38 | .29 | .84 | 1.97 | 1.25 | 1.63 | 1.15 | .33 | 1.24 | 13.41 |
| Arkansas | 10.16 | 3.98 | 5.42 | 2.75 | 5.29 | 5.17 | 4.32 | 3.11 | 3.20 | 8.50 | .37 | 4.77 | 57.04 |
| California | 2.30 | 2.68 | 4.30 | .16 | 1.08 | .06 | .02 | .10 | .09 | .27 | 1.68 | 1.94 | 14.68 |
| Colorado | 1.50 | .57 | 1.52 | 1.13 | 2.50 | 3.26 | 2.18 | 1.30 | .85 | 1.24 | .24 | .55 | 16.84 |
| Florida | .88 | 2.09 | 2.19 | 5.16 | 2.34 | 7.55 | 7.86 | 11.05 | 7.60 | 3.72 | 1.86 | 2.39 | 55.29 |
| Georgia | 3.03 | 5.58 | 2.98 | 5.71 | 3.50 | 5.10 | 5.66 | 6.81 | 3.26 | 3.07 | 1.08 | 2.52 | 48.30 |
| Idaho | 1.00 | 2.91 | 1.03 | .54 | 2.02 | .65 | .30 | .35 | .88 | 1.53 | 1.87 | 1.72 | 14.80 |
| Illinois | 6.09 | 2.63 | 3.21 | 1.77 | 2.77 | 4.19 | 4.40 | 2.90 | 2.76 | 5.17 | .67 | 4.72 | 41.28 |
| Indiana | 7.74 | 2.89 | 3.81 | 2.01 | 3.36 | 5.36 | 3.50 | 3.66 | 2.64 | 4.89 | 1.12 | 4.21 | 45.19 |
| Iowa | 2.72 | .87 | 2.44 | 1.33 | 2.68 | 5.51 | 3.47 | 2.34 | 3.21 | 1.93 | .49 | 1.07 | 28.06 |
| Kansas | 3.09 | 1.14 | 1.96 | 2.18 | 5.34 | 5.93 | 3.83 | 2.72 | 2.22 | 2.42 | .15 | .87 | 31.85 |
| Kentucky | 6.86 | 5.35 | 5.17 | 3.52 | 2.78 | 5.52 | 4.09 | 4.54 | 1.84 | 4.53 | 1.82 | 5.70 | 51.72 |
| Louisiana | 6.11 | 4.82 | 8.25 | 6.53 | 2.35 | 5.20 | 8.03 | 4.04 | 3.94 | 7.30 | .34 | 5.00 | 61.01 |
| Maryland-Delaware | 5.30 | 3.40 | 2.83 | 2.77 | 4.77 | 2.02 | 4.63 | 4.32 | 3.29 | 3.57 | 1.68 | 2.28 | 40.86 |
| Michigan | 2.70 | 2.10 | 2.05 | 1.62 | 2.75 | 4.17 | 4.21 | 2.45 | 2.78 | 2.49 | 2.25 | 2.80 | 32.37 |
| Minnesota | 1.55 | .41 | 1.71 | .74 | 3.24 | 4.08 | 6.20 | 2.01 | 1.74 | 3.24 | .94 | 1.02 | 26.88 |
| Mississippi | 8.69 | 5.22 | 8.45 | 5.11 | 4.68 | 5.51 | 6.28 | 3.89 | 3.77 | 4.75 | .39 | 4.21 | 60.95 |
| Missouri | 6.37 | 2.58 | 3.42 | 1.65 | 4.59 | 6.55 | 4.90 | 3.04 | 4.78 | 6.09 | .45 | 3.67 | 48.09 |
| Montana | .84 | .95 | .80 | .57 | 1.94 | 1.71 | 1.26 | .57 | 1.02 | 1.34 | .48 | .88 | 12.36 |
| Nebraska | 1.90 | .29 | 2.46 | 1.52 | 4.84 | 4.92 | 2.36 | 2.74 | 2.19 | 1.70 | .17 | .29 | 25.38 |
| Nevada | 1.39 | .94 | .79 | .24 | 1.77 | .38 | .26 | .28 | .27 | .40 | .52 | .48 | 7.72 |
| New England | 4.08 | 2.85 | 2.23 | 3.47 | 3.75 | 1.70 | 2.74 | 2.86 | 4.28 | 2.20 | 3.13 | 2.51 | 35.89 |
| New Jersey | 5.99 | 3.68 | 2.61 | 3.73 | 4.77 | .23 | 3.87 | 3.60 | 4.20 | 2.49 | 1.61 | 2.94 | 39.72 |
| New Mexico | 1.61 | .63 | .45 | .92 | 1.23 | 2.11 | 3.01 | 1.62 | 2.44 | .71 | .07 | .55 | 15.35 |
| New York | 3.49 | 2.41 | 1.96 | 3.33 | 3.15 | 1.47 | 3.28 | 4.28 | 3.64 | 1.79 | 2.09 | 2.74 | 34.23 |
| North Carolina | 2.83 | 3.75 | 2.94 | 4.46 | 4.68 | 6.26 | 6.65 | 9.31 | 4.02 | 4.10 | 2.87 | 2.30 | 54.17 |
| North Dakota | 1.14 | .46 | .60 | .45 | 2.34 | 2.64 | 3.56 | .99 | .56 | 2.55 | .30 | .65 | 16.24 |
| Ohio | 5.58 | 2.70 | 2.91 | 2.67 | 3.05 | 4.25 | 4.22 | 3.31 | 2.71 | 1.68 | 1.47 | 2.96 | 37.51 |
| Oklahoma | 5.41 | 2.23 | 2.30 | 2.07 | 7.94 | 5.00 | 2.72 | 2.00 | 3.87 | 3.57 | .13 | 1.64 | 38.88 |
| Oregon | 1.09 | 5.93 | 2.39 | .83 | 2.37 | .51 | .22 | .14 | 1.03 | 1.89 | 3.84 | 3.57 | 23.81 |
| Pennsylvania | 4.46 | 2.60 | 1.99 | 3.65 | 3.78 | 1.92 | 5.53 | 3.67 | 3.15 | 2.29 | 1.77 | 3.32 | 38.13 |
| South Carolina | 2.19 | 5.08 | 2.09 | 5.06 | 3.42 | 4.26 | 5.07 | 9.94 | 3.93 | 3.51 | 2.28 | 1.92 | 48.75 |
| South Dakota | 1.51 | .14 | 1.22 | 1.18 | 2.58 | 2.00 | 2.02 | 1.93 | 1.57 | 2.15 | .24 | .65 | 17.19 |
| Tennessee | 8.43 | 3.42 | 5.56 | 4.15 | 3.68 | 7.01 | 5.90 | 4.28 | 2.00 | 6.61 | 1.25 | 5.18 | 57.47 |
| Texas | 3.62 | 2.37 | 1.78 | 3.96 | 3.25 | 3.23 | 2.94 | 2.32 | 2.80 | 5.56 | .13 | 2.38 | 34.34 |
| Utah | 2.11 | .90 | 1.46 | .52 | 1.92 | 1.47 | .70 | .54 | .77 | 1.89 | .59 | 1.80 | 14.67 |
| Virginia | 3.78 | 2.69 | 2.66 | 3.50 | 4.75 | 4.72 | 5.84 | 7.01 | 2.83 | 3.40 | 2.02 | 2.17 | 45.37 |
| Washington | .99 | 6.25 | 2.51 | 1.30 | 1.14 | .75 | .66 | .61 | 1.38 | 2.96 | 5.95 | 5.34 | 29.84 |
| West Virginia | 4.87 | 3.22 | 2.50 | 3.52 | 3.74 | 5.85 | 5.35 | 4.33 | 2.62 | 2.99 | 2.64 | 3.82 | 45.45 |
| Wisconsin | 1.92 | .80 | 2.35 | 1.64 | 2.28 | 4.99 | 5.53 | 2.20 | 2.01 | 1.80 | 1.20 | 1.28 | 28.00 |
| Wyoming | 1.35 | .69 | .98 | .94 | 2.57 | 2.14 | .97 | .58 | .90 | 1.85 | .36 | .71 | 14.04 |

During the remainder of the month cold, rather dry weather prevailed in the West, while temperatures in the East were mild and rainfall was heavy in the Ohio and lower and central Mississippi Valleys.

This change in the weather pattern began with an intense storm which moved across the central portion of the country on the 11th and 12th. On these dates strong southerly winds preceding the storm brought unseasonably high temperatures to States east of the Mississippi River. Many stations in the Lake Region reported the highest temperatures on record for so late in the season. At the same time heavy rains fell in the lower and middle Mississippi Valley and local blizzards raged in the northern Great Plains and northern Rockies.

This storm was followed by a cold wave that brought subzero temperatures southward to northern Arizona, New Mexico, and Kansas, and below-freezing minima to the extreme Southwest. By the 14th this cold air had overspread the Eastern States, and during the next day or two temperatures were normal or below with frost as far south as some Gulf stations and northern Florida.

From the 20th to 24th another cold air mass overspread the entire country. It brought damaging frosts to the coastal valleys of southern California and the Yuma and Salt River Valleys of Arizona on the 21st, to parts of the lower Rio Grande Valley of Texas on the 23d, and to northern Florida by the 24th. Heavy rains fell in the Midwest during this period, and a severe ice storm damaged communication lines and trees in northern Missouri and portions of western Illinois. Fair weather with rising temperatures generally prevailed over the entire country during the closing days of the month.

# TORNADOES IN THE UNITED STATES DURING 1949

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A greater number of tornadoes was reported in the United States during 1949 than in any previous year of record. The 290 tornadoes reported during 1949 exceeded by 142 the annual average, based on the period from 1916 through 1949. The next greatest annual number during this 34-year period occurred in 1933, when 260 tornadoes were reported. Oklahoma reported 62 tornadoes in 1949, the greatest number in any State during the year; Kansas ran a close second with 56; and Missouri was third with 23. Nine tornadoes crossed State boundaries. Tornadoes were reported during each month, on 85 days of the year, and in 33 states.

These storms reached the record-breaking number of 118 during May in contrast to an average of 43 for the month. The greatest number previously recorded in the United States during May was 91 in 1933 and the least number was 5 in 1925. Tornado activity was greatest during the 7-day period, May 15 through 21, in the area from northwestern Texas northeastward over Oklahoma, Kansas, Nebraska, Missouri, and parts of Illinois and Indiana. The three most destructive tornadoes of the year occurred during this period. More tornadoes occurred in Oklahoma during May than in any other State. The total of 33 for the month is greater than ever previously recorded in Oklahoma for an entire year. Kansas was next with a May total of 29, including several funnel clouds which were observed but did not reach the ground. The annual average for this State, over a 34-year period, is 18. April brought the next largest number of these storms, with 34 occurring over the whole country. June was third with 33, and March fourth with 30.

During 1949, tornadoes were responsible for 213 deaths, which is 73 more than occurred in 1948 and 19 less than the yearly average for the country. Arkansas' death toll of 81, 57 of these occurring in a single storm on January 3, was the greatest for any State. In the entire country 69 fatalities occurred during May; this was the greatest number for any month. None occurred during February, July, or August. Total property damage for 1949 in the United States was estimated at $29,940,600, which is more than double the yearly average loss, but $10,759,050 less than in 1948. The greatest property loss for any state was $5,910,100 in Missouri, followed by $5,585,400 in Texas, and $5,526,600 in Oklahoma. Other states in which the damage reached or exceeded $1,000,000 were Arkansas, Indiana, Illinois, Mississippi, Kansas, and South Dakota.

The tornado which caused the greatest property damage struck Amarillo, Tex., on May 15. Property in three city blocks was totally destroyed, with tornado, wind, and hail damage estimated at about $5,300,000. Six persons were killed, and 83 injured. The most destructive storm in Missouri since the St. Louis tornado of September 27, 1927, originated in Cape Girardeau County, Mo., on May 21, 1949, traveled northeastward, and crossed the Mississippi River into Illinois. All of the estimated damage of $4,000,000, however, occurred in Missouri. Twenty-three persons lost their lives, most of them residents of the city of Cape Girardeau which received the brunt of the storm as it passed through the center of the residential district. Another severe tornado on May 21, started near Lambert Field Airport, St. Louis, Mo., and crossed the Mississippi River to Wood River, Ill., where it inflicted great damage. Property damage in Missouri was estimated at $500,000 with no loss of life, but in Illinois the damage amounted to $1,300,000, and five persons were killed.

Three other tornadoes, each causing property damage of more than $1,000,000, occurred on January 3, March 26, and May 21. The January 3 tornado destroyed property estimated at nearly $1,500,000, and its death toll of 58 was the year's greatest for a single storm. It originated in Caddo Parish, La., and after crossing northwestern Louisiana and Columbia, Union, Ouachita, Calhoun, Bradley, and Drew Counties, Ark., dissipated near the Lincoln-Desha County line in that State. The March 26 storm crossed Oklahoma and part of Kansas, causing damage of a little over $1,000,000, and a loss of four lives. The tornado on May 21 began in Illinois and crossed into Indiana where the entire amount of property damage of slightly more than $1,000,000, and 14 fatalities occurred.

A few tornadoes were reported from areas where their occurrence is infrequent or rare. Some of these were observed as funnel clouds which failed to reach the ground. Five of the six tornadoes that occurred in Wyoming were of this character; two being observed near Cheyenne during May, and during June, two in the vicinity of Buffalo and one at Marshall. A small funnel cloud which apparently remained aloft was reported on June 6, about 4 miles east of Cimarron, New Mexico.

The first tornado officially recorded in Nevada was observed north of Reno, on April 18, 1949. A clearly-defined funnel cloud, plainly visible from the city, touched ground at Dry Lake about 15 miles north of Reno, and in 32 minutes swept a path 70 yards wide and 12 miles long across the low divide between Lemon Valley and Spanish Springs Valley, disappearing on the eastern side of Spanish Springs Valley. Twisted and torn juniper trees and desert sage gave evidence that the tornado was sufficiently well developed to destroy buildings, although none were in its path. Minor roof damage at a dude ranch not far distant was the only property damage reported during its passage. Heavy hail immediately followed the tornado, but this also missed any cultivated or populated area.

The tabulations for 1949 are shown in table 1, which follows. They are derived from data on "Severe Storms" appearing in the MONTHLY WEATHER REVIEW and in the CLIMATOLOGICAL DATA publications for the different sections of the United States. The listing shows the approximate monthly and annual number of tornadoes, the number of resultant deaths and injuries, and the property damage caused in the several States and the country as a whole. The "Tracks of Tornadoes during 1949" are shown by chart. There is also included a tabulation (table 2) that shows by years the number of tornadoes and the resulting losses of life and property during the period 1916–49.

TABLE 1.—*Tornadoes and probable tornadoes during 1949*

| State[1] | January | February | March | April | May | June | July | August | September | October | November | December | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama: | | | | | | | | | | | | | |
| Number | | 1 | | | | | | 1 | | | 3 | | 5 |
| Deaths | | 0 | | | | | | 0 | | | 16 | | 16 |
| Injuries | | 5 | | | | | | 0 | | | 49 | | 54 |
| Damage ($X1,000) | | 8.0 | | | | | | 3.3 | | | 144.0 | | 155.3 |
| Arkansas: | | | | | | | | | | | | | |
| Number | 3 | | 3 | | 1 | | | | | | | 3 | 10 |
| Deaths | 57 | | 19 | | 0 | | | | | | | 5 | 81 |
| Injuries | 420 | | 52 | | 0 | | | | | | | 11 | 483 |
| Damage ($X1,000) | 1,345.6 | | 603.5 | | 3.0 | | | | | | | 127.0 | 2,079.1 |
| Colorado: | | | | | | | | | | | | | |
| Number | | | | | 2 | 1 | 1 | | | | | | 4 |
| Deaths | | | | | 0 | 0 | 0 | | | | | | 0 |
| Injuries | | | | | 0 | 0 | 0 | | | | | | 0 |
| Damage ($X1,000) | | | | | 200.0 | 15.0 | 5.0 | | | | | | 220.0 |
| Florida: | | | | | | | | | | | | | |
| Number | | 1 | 4 | 1 | 1 | 1 | 1 | 1 | | | 1 | | 11 |
| Deaths | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | | 0 |
| Injuries | | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | | 0 | | 2 |
| Damage ($X1,000) | | 1.0 | 25.0 | 10.0 | 0 | 0 | 0.5 | 0.1 | | | 40.0 | | 76.6 |
| Georgia: | | | | | | | | | | | | | |
| Number | | | | 7 | | | | | | | | | 7 |
| Deaths | | | | 4 | | | | | | | | | 4 |
| Injuries | | | | 36 | | | | | | | | | 36 |
| Damage ($X1,000) | | | | 314.0 | | | | | | | | | 314.0 |
| Illinois: | | | | | | | | | | | | | |
| Number | | | 1 | | 3 | | | | | | | 2 | 6 |
| Deaths | | | 0 | | 9 | | | | | | | 0 | 9 |
| Injuries | | | 0 | | 67 | | | | | | | 1 | 68 |
| Damage ($X1,000) | | | 35.0 | | 1,410.0 | | | | | | | 25.0 | 1,470.0 |
| Indiana: | | | | | | | | | | | | | |
| Number | | 2 | | 1 | 3 | | | | | | | | 6 |
| Deaths | | 0 | | 0 | 17 | | | | | | | | 17 |
| Injuries | | 0 | | 0 | 256 | | | | | | | | 256 |
| Damage ($X1,000) | | 50.6 | | 5.0 | 1,510.0 | | | | | | | | 1,565.6 |
| Iowa: | | | | | | | | | | | | | |
| Number | | | | | 2 | 2 | | | | | | | 0 |
| Deaths | | | | | 0 | 0 | | | | | | | 0 |
| Injuries | | | | | 0 | 0 | | | | | | | 0 |
| Damage ($X1,000) | | | | | 30.0 | 200.0 | | | | | | | 230.0 |
| Kansas: | | | | | | | | | | | | | |
| Number | 3 | 1 | 1 | 5 | 29 | 4 | | 1 | 1 | 11 | | | 56 |
| Deaths | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 1 | | | 3 |
| Injuries | 1 | 0 | 2 | 0 | 9 | 0 | | 0 | 0 | 2 | | | 14 |
| Damage ($X1,000) | 165.5 | 5.5 | 10.0 | 12.5 | 498.5 | 83.0 | | (2) | 35.0 | [3] 290.0 | | | [3] 1,100.0 |
| Kentucky: | | | | | | | | | | | | | |
| Number | | | 2 | | 2 | | | | | | | | 4 |
| Deaths | | | 0 | | 1 | | | | | | | | 1 |
| Injuries | | | 4 | | 4 | | | | | | | | 8 |
| Damage ($X1,000) | | | 39.4 | | 760.0 | | | | | | | | 799.4 |
| Louisiana: | | | | | | | | | | | | | |
| Number | 2 | | 3 | | 1 | | 2 | | | | | 1 | 9 |
| Deaths | 2 | | 0 | | 1 | | 0 | | | | | 0 | 3 |
| Injuries | 21 | | 5 | | 12 | | 0 | | | | | 1 | 39 |
| Damage ($X1,000) | 235.0 | | 136.0 | | 25.0 | | 50.0 | | | | | 15.0 | 461.0 |
| Delaware: | | | | | | | | | | | | | |
| Number | | | | | | | | | | 1 | | | 1 |
| Deaths | | | | | | | | | | 0 | | | 0 |
| Injuries | | | | | | | | | | 1 | | | 1 |
| Damage ($X1,000) | | | | | | | | | | 16.5 | | | 16.5 |
| Michigan: | | | | | | | | | | | | | |
| Number | | | | | | | | 1 | | | | | 1 |
| Deaths | | | | | | | | 0 | | | | | 0 |
| Injuries | | | | | | | | 0 | | | | | 0 |
| Damage ($X1,000) | | | | | | | | 10.0 | | | | | 10.0 |
| Minnesota: | | | | | | | | | | | | | |
| Number | | | | 1 | 1 | | 1 | 1 | | | | | 4 |
| Deaths | | | | 0 | 0 | | 0 | 0 | | | | | 0 |
| Injuries | | | | 1 | 0 | | 0 | 0 | | | | | 1 |
| Damage ($X1,000) | | | | 75.0 | 32.0 | | 15.0 | 7.0 | | | | | 129.0 |
| Mississippi: | | | | | | | | | | | | | |
| Number | 1 | | 6 | | 3 | | | | | | | | 10 |
| Deaths | 2 | | 10 | | 0 | | | | | | | | 12 |
| Injuries | 17 | | 121 | | 1 | | | | | | | | 139 |
| Damage ($X1,000) | 100.0 | | 1,109.0 | | 140.0 | | | | | | | | 1,349.0 |
| Missouri: | | | | | | | | | | | | | |
| Number | | 1 | 1 | | 8 | 8 | | | 1 | 1 | 1 | 2 | 23 |
| Deaths | | 0 | 0 | | 26 | 0 | | | 1 | 0 | 0 | 6 | 33 |
| Injuries | | 1 | 7 | | 218 | (4) | | | 0 | 0 | 0 | 15 | [4] 247 |
| Damage ($X1,000) | | 13.5 | 1.0 | | 5,417.1 | 111.5 | | | 32.0 | 5.0 | 30.0 | 300.0 | 5,910.1 |
| Montana: | | | | | | | | | | | | | |
| Number | | | | | | | 1 | | | | | | 1 |
| Deaths | | | | | | | 0 | | | | | | 0 |
| Injuries | | | | | | | 0 | | | | | | 0 |
| Damage ($X1,000) | | | | | | | (3) | | | | | | (3) |
| Nebraska: | | | | | | | | | | | | | |
| Number | | | | | 6 | 4 | | | | 3 | | | 13 |
| Deaths | | | | | 0 | 3 | | | | 1 | | | 4 |
| Injuries | | | | | 6 | 7 | | | | 4 | | | 17 |
| Damage ($X1,000) | | | | | 261.7 | 487.0 | | | | 245.3 | | | 994.0 |

See footnotes at end of table, p. 337.

TABLE 1.—*Tornadoes and probable tornadoes during 1949*—Continued

| State [1] | January | February | March | April | May | June | July | August | September | October | November | December | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nevada: | | | | | | | | | | | | | |
| Number | | | | 1 | | | | | | | | | 1 |
| Deaths | | | | 0 | | | | | | | | | 0 |
| Injuries | | | | 0 | | | | | | | | | 0 |
| Damage ($×1,000) | | | | [2] | | | | | | | | | [2] |
| Connecticut: | | | | | | | | | | | | | |
| Number | | | | | | | | 1 | | | | | 1 |
| Deaths | | | | | | | | 0 | | | | | 0 |
| Injuries | | | | | | | | 0 | | | | | 0 |
| Damage ($×1,000) | | | | | | | | [2] | | | | | [2] |
| New Mexico: | | | | | | | | | | | | | |
| Number | | | | | | 2 | | | | | | | 2 |
| Deaths | | | | | | 0 | | | | | | | 0 |
| Injuries | | | | | | 0 | | | | | | | 0 |
| Damage ($×1,000) | | | | | | [2] | | | | | | | [2] |
| North Carolina: | | | | | | | | | | | | | |
| Number | | | 1 | | 1 | | | 4 | | | | | 6 |
| Deaths | | | 0 | | 0 | | | 0 | | | | | 0 |
| Injuries | | | 0 | | [4] | | | 3 | | | | | [3] |
| Damage ($×1,000) | | | [2] | | 100.0 | | | [3] 195.0 | | | | | [3] 295.0 |
| North Dakota: | | | | | | | | | | | | | |
| Number | | | | | 1 | | | | | | | | 1 |
| Deaths | | | | | 0 | | | | | | | | 0 |
| Injuries | | | | | 0 | | | | | | | | 0 |
| Damage ($×1,000) | | | | | 10.0 | | | | | | | | 10.0 |
| Oklahoma: | | | | | | | | | | | | | |
| Number | | 1 | 3 | 14 | 33 | 7 | | 1 | | 2 | | 1 | 62 |
| Deaths | | 0 | 6 | 6 | 5 | 0 | | 0 | | 0 | | 0 | 17 |
| Injuries | | 2 | 63 | 71 | 59 | 0 | | 0 | | 2 | | 0 | 197 |
| Damage ($×1,000) | | 10.0 | 1,318.0 | 1,590.0 | 2,497.5 | 4.0 | | 0.8 | | 106.0 | | 0.3 | 5,526.6 |
| Pennsylvania: | | | | | | | | | | | | | |
| Number | | | 1 | 1 | 5 | | | | | | | | 7 |
| Deaths | | | 0 | 0 | 0 | | | | | | | | 0 |
| Injuries | | | 3 | 2 | 10 | | | | | | | | 15 |
| Damage ($×1,000) | | | 140.0 | 4.0 | [2] | | | | | | | | [3] 144.0 |
| South Dakota: | | | | | | | | | | | | | |
| Number | | | 1 | | | | 2 | | | | | | 3 |
| Deaths | | | 0 | | | | 0 | | | | | | 0 |
| Injuries | | | 0 | | | | 0 | | | | | | 0 |
| Damage ($×1,000) | | | [2] | | | | 1,000.0 | | | | | | [3] 1,000.0 |
| Tennessee: | | | | | | | | | | | | | |
| Number | | | 1 | | 6 | | | | | | | | 7 |
| Deaths | | | 0 | | 0 | | | | | | | | 0 |
| Injuries | | | 2 | | 6 | | | | | | | | 8 |
| Damage ($×1,000) | | | 100.0 | | 387.5 | | | | | | | | 487.5 |
| Texas: | | | | | | | | | | | | | |
| Number | | | 5 | 3 | 10 | | 1 | | | 3 | | | 22 |
| Deaths | | | 0 | 3 | 9 | | 0 | | | 1 | | | 13 |
| Injuries | | | 6 | 9 | 94 | | 0 | | | 3 | | | 112 |
| Damage ($×1,000) | | | 376.0 | 83.0 | 5,116.4 | | 0 | | | [3] 10.0 | | | [3] 5,585.4 |
| Virginia: | | | | | | | | | | | | | |
| Number | | | | | 1 | | | | | | | | 1 |
| Deaths | | | | | 0 | | | | | | | | 0 |
| Injuries | | | | | 0 | | | | | | | | 0 |
| Damage ($×1,000) | | | | | [2] | | | | | | | | [2] |
| Washington: | | | | | | | | | | | | | |
| Number | | | | | | | | | | | | 1 | 1 |
| Deaths | | | | | | | | | | | | 0 | 0 |
| Injuries | | | | | | | | | | | | 0 | 0 |
| Damage ($×1,000) | | | | | | | | | | | | 1.0 | 1.0 |
| West Virginia: | | | | | | | | | | | | | |
| Number | | | | | | | | | 1 | | | | 1 |
| Deaths | | | | | | | | | 0 | | | | 0 |
| Injuries | | | | | | | | | 0 | | | | 0 |
| Damage ($×1,000) | | | | | | | | | 2.5 | | | | 2.5 |
| Wisconsin: | | | | | | | | | | | | | |
| Number | | | | | 1 | | 2 | | | | | | 3 |
| Deaths | | | | | 0 | | 0 | | | | | | 0 |
| Injuries | | | | | 0 | | 0 | | | | | | 0 |
| Damage ($×1,000) | | | | | [2] | | [2] | | | | | | [2] |
| Wyoming: | | | | | | | | | | | | | |
| Number | | | | | 2 | 4 | | | | | | | 6 |
| Deaths | | | | | 0 | 0 | | | | | | | 0 |
| Injuries | | | | | 0 | 0 | | | | | | | 0 |
| Damage ($×1,000) | | | | | 0 | [2] | | | | | | | [2] |
| Total: | | | | | | | | | | | | | |
| Number | [3] 8 | 7 | [3] 30 | 34 | [3] 118 | 33 | 11 | 11 | [3] 2 | 21 | 5 | 10 | [3] 290 |
| Deaths | 61 | 0 | 35 | 13 | 69 | 3 | 0 | 0 | 2 | 3 | 16 | 11 | 213 |
| Injuries | 459 | 8 | 266 | 120 | [3] 742 | [3] 7 | 0 | 3 | 0 | 12 | 49 | 28 | [3] 1,694 |
| Damage ($×1,000) | 1,846.1 | 88.6 | [3] 3,892.9 | [3] 2,093.5 | [3] 18,398.7 | [3] 900.5 | [3] 1,070.5 | [3] 216.2 | 69.5 | [3] 681.8 | 214.0 | 468.3 | [3] 29,940.6 |

[1] None reported for States not listed.
[2] Datum unobtained.
[3] Not complete.
[4] Several.
[5] Corrected for boundary-crossing tornadoes. See following tabulation:

*Boundary-Crossing Tornadoes*

| Date | States | Date | States |
|---|---|---|---|
| Jan. 3 | La.-Ark. | May 21 | Mo.-Ill. |
| Mar. 24 | La.-Miss. | May 21 | Mo.-Ill. |
| Mar. 26 | Okla.-Ark. | May 21 | Ill.-Ind. |
| Mar. 30 | Okla.-Kans. | Sept. 12 | Kans.-Mo. |
| May 20 | Colo.-Nebr. | | |

TABLE 2.—*Tornadoes in the United States by years, 1916–49 inclusive*

| Year | Number reported | Total loss of life | Most deaths in a single tornado | Total reported property losses | Number of tornadoes causing losses of | |
|---|---|---|---|---|---|---|
| | | | | | $100,000 | $1,000,000 |
| 1916 | 90 | 150 | 30 | $2,264,500 | 6 | 1 |
| 1917 | 121 | 509 | 101 | 15,007,700 | 22 | 5 |
| 1918 | 81 | 135 | 36 | 7,431,150 | 19 | 1 |
| 1919 | 65 | 206 | 59 | 6,861,500 | 9 | 2 |
| 1920 | 87 | 498 | 87 | 15,007,500 | 24 | 7 |
| 1921 | 106 | 202 | 61 | 5,456,300 | 13 | 1 |
| 1922 | 108 | 135 | 16 | 6,880,000 | 20 | 0 |
| 1923 | 102 | 109 | 23 | 2,968,725 | 8 | 0 |
| 1924 | 130 | 376 | 85 | 26,072,350 | 25 | 6 |
| 1925 | 119 | 794 | 689 | 24,039,900 | 29 | 1 |
| 1926 | 111 | 144 | 23 | 4,323,950 | 16 | 0 |
| 1927 | 164 | 540 | 92 | 43,455,650 | 28 | 7 |
| 1928 | 203 | 92 | 14 | 13,235,600 | 25 | 4 |
| 1929 | 197 | 274 | 40 | 10,112,400 | 30 | 1 |
| 1930 | 192 | 179 | 41 | 12,289,100 | 28 | 3 |
| 1931 | 94 | 36 | 6 | 3,215,900 | 7 | 1 |
| 1932 | 152 | 394 | 37 | 8,888,525 | 11 | 1 |
| 1933 | 260 | 362 | 34 | 16,190,640 | 31 | 5 |
| 1934 | 147 | 47 | 6 | 4,424,950 | 9 | 0 |
| 1935 | 182 | 70 | 11 | 4,631,430 | 15 | 0 |
| 1936 | 159 | 552 | 216 | 26,228,550 | 17 | 6 |
| 1937 | 148 | 29 | 5 | 3,155,875 | 11 | 0 |
| 1938 | 220 | 183 | 32 | 8,793,457 | 18 | 3 |
| 1939 | 155 | 87 | 27 | 5,891,930 | 10 | 2 |
| 1940 | 128 | 65 | 18 | 6,015,320 | 9 | 1 |
| 1941 | 118 | 53 | 25 | 4,492,650 | 15 | 0 |
| 1942 | 170 | 384 | 65 | 15,268,950 | 32 | 3 |
| 1943 | 154 | 58 | 5 | 12,198,400 | 25 | 4 |
| 1944 | 175 | 275 | 100 | 21,594,150 | 34 | 7 |
| 1945 | 126 | 210 | 69 | 21,919,800 | 25 | 8 |
| 1946 | 109 | 78 | 15 | 12,267,015 | 31 | 3 |
| 1947 | 171 | 313 | 169 | 23,994,680 | 42 | 5 |
| 1948 | 190 | 140 | 33 | 40,699,650 | 53 | 6 |
| 1949 (preliminary) | 290 | 213 | 58 | 29,940,600 | 34 | 8 |
| Sum | 5,024 | 7,892 | | 465,248,797 | 731 | 102 |
| Mean | 148 | 232 | | 13,683,788 | | |

NOTE.—268 deaths occurred in Alabama during a series of tornadoes on Mar. 21, 1932.

# NORTH ATLANTIC HURRICANES AND TROPICAL DISTURBANCES OF 1949

Richmond T. Zoch

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Eleven tropical disturbances occurred in the North Atlantic during 1949.

I. *Hurricane of August 21–25.*—The first disturbance was discovered on August 21, 300 miles north of San Juan, Puerto Rico, moving west-northwest at 18 m. p. h. Six hours after discovery the storm was well developed with winds of 80 m. p. h. reported by surface vessels in its path. The hurricane moved west-northwest from the point of discovery to the position 27.5° N., 75° W., where it began to curve northward. Moving at a speed of 15 to 18 m.p.h., the hurricane passed over Diamond Shoals Lightship located off Cape Hatteras, N. C. As the eye of the storm passed over the Lightship, a 15-minute calm and a minimum pressure of 977.3 mb. (28.86 in.) were recorded. Shortly afterward the storm curved northeastward and finally eastward into the Atlantic.

The French ship *Marseille* passed through the center of this hurricane on August 25 at 1200 G. M. T. At this time the ship was at 38.0° N. and 60.3° W., and the lowest pressure recorded on the ship's barograph was 722 mm. (962.6 mb.; 28.43 in.). The captain of the ship reports as follows:

> At first we experienced extremely strong southwest winds, overcast skies and rough seas. Next, these winds brought heavy rain reducing the visibility to almost zero. Afterwards, there was a short interval of almost calm, a small clearing at the zenith, and an enormous confused swell. Finally, the wind shifted to the northeast, blew with practically the same force, and gradually became a northwest wind.

II. *Hurricane of August 23–29.*—The second hurricane in 1949 caused more than $52,000,000 property and crop damage in the southeastern States, about $45,000,000 of which occurred in Florida. It caused the death of 2 persons and injured 133 others, 12 seriously. This hurricane was discovered in its formative stages on August 23 about 125 miles northeast of St. Martin, Leeward Islands, at latitude 19° N., longitude 61.5° W. It moved on a west-northwestward course for a time as a partially developed easterly wave, and some characteristics of the wave could be observed until the storm moved into the Bahama Islands two days later. The storm was well developed, however, by the time its center passed a short distance north of Nassau at about 5 a. m. of the 26th. It was over West Palm Beach Airport from 6:37 to 7:57 p. m., and a calm was experienced for 22 minutes from 7:20 to 7:42 p. m. The lowest sea level pressure was 28.17 in. recorded at the Weather Bureau Airport Station, West Palm Beach. The microbarograph trace for this station is reproduced in figure 1. The wind instrument was blown down when the velocity reached 110 m. p. h. with gusts of 125 m. p. h. The Official in Charge at the station estimated the highest wind at 120 m. p. h. with gusts of 130 m. p. h. A privately owned anemometer on Palm Beach, the accuracy of which is unknown, recorded gusts of 155 m. p. h.

The strongest wind occurred, as usual, some distance to the right of the center in the vicinity of Jupiter and Stuart, Florida. The anemometer failed at Jupiter Lighthouse after reaching a velocity of 153 m. p. h. The observer reported that winds were somewhat stronger thereafter, but he felt unable to make a reliable estimate of the peak strength.

After leaving the east coast of Florida, the center of the storm crossed the northern part of Lake Okeechobee during the early part of the night of the 26th. The storm was the worst felt in that section since the disastrous hurricane of September 1928. The highest winds registered around the lake ranged from 100 to 126 m. p. h. on the instruments of the U. S. Army Engineers. The water of the lake rose 12 feet or more at places on the southeast and east side of the lake, but the levees held and there was no flooding from the lake.

After leaving the Lake Okeechobee area, the center passed northwestward through the heart of Florida's main citrus belt, where much fruit was destroyed, and upon reaching the west coast north of Tampa it turned northward and moved through Georgia and the Carolinas as a weakened disturbance. Figure 2 shows the path of this hurricane over Florida.

Pertinent meteorological information about this hurricane can be found on the backs of the Washington Daily Weather Map for October 31 and November 1, 1949.

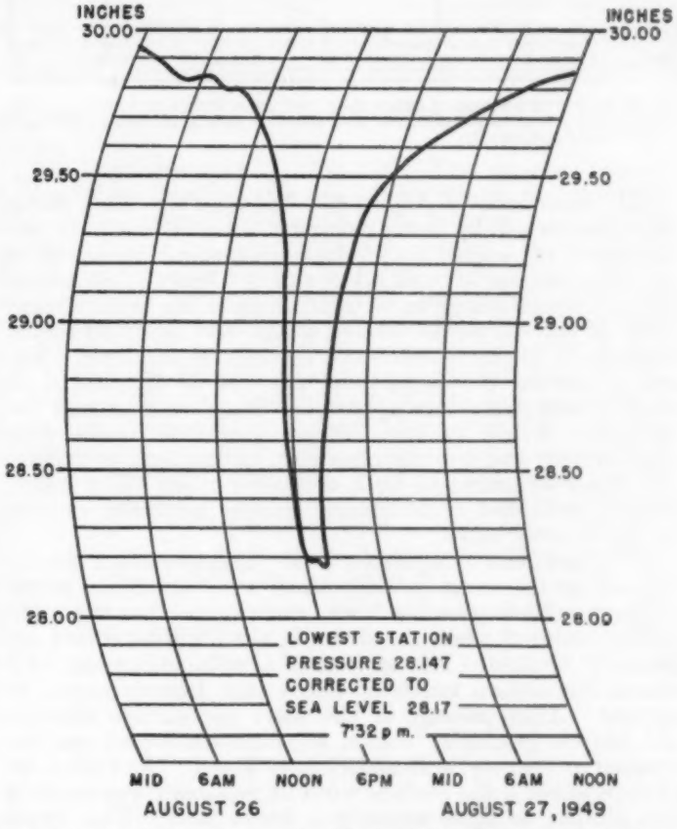



FIGURE 1.—Microbarograph trace at West Palm Beach, Fla., during passage of hurricane of August 23–29, 1949.

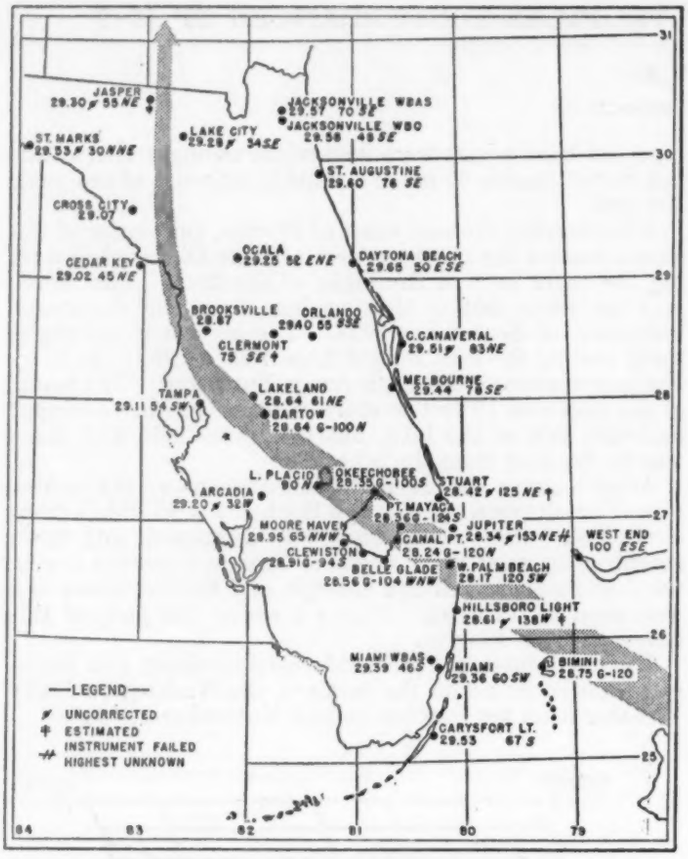



FIGURE 2.—Path of hurricane of August 23–29, 1949, across Florida on August 26 and 27. Lowest pressure (inches) and highest sustained wind velocity are shown. "G" indicates highest gust velocity.

III. *Hurricane of August 30–September 2.*—This storm was discovered by reconnaissance aircraft early in the afternoon of August 30. Although aircraft encountered winds as high as 50 to 60 knots at 1,000 feet and estimated surface winds as high as 45 to 50 knots in the eastern semicircle of the storm, no surface winds were reported higher than the 31 knots recorded at Caravelle, Martinique. Aircraft reported the location of the eye of this storm on several occasions, but apparently it never was well developed. Winds in the western semicircle never were very strong, and on the afternoon of September 2 there no longer appeared to be a definite center. The storm, having weakened considerably, moved westward as part of the easterly wave.

IV. *Hurricane of September 3–8.*—This storm apparently formed on the same easterly wave with which the storm of August 30–September 2 was associated. On the night of September 2 when the storm in the Caribbean had apparently weakened into an area of squalls, indications of a closed circulation north of the Virgin Islands began to appear. After passage of the wave the surface wind in the islands gradually veered to south-southwest and increased in velocity to Beaufort force 5 to 7. At 8:30 p. m. of September 2 the surface wind at San Juan was easterly but shifted to light westerly 3 hours later. The upper air at this time had westerly winds at all levels up to 25,000 feet. The storm rapidly developed to hurricane force and by late afternoon, September 3, aircraft estimated winds of 75 m. p. h. Rapid intensification continued as the storm moved north-northwestward on the 4th and 5th to about latitude 26° N., longitude 67° to 68° W., where it remained at nearly a standstill for 2 days, probably with a slow eastward drift. By afternoon of September 7 it had become a hurricane of great size and severity, and a north to north-northeastward movement was resumed. The center passed 60 to 70 miles east of Bermuda about 11 a. m. of September 8. Bermuda experienced strong gale winds but escaped hurricane force, since hurricane winds did not extend very far west of the center. North-northeast movement continued and the center passed very near Cape Race, Newfoundland, on the early morning of September 10, but by this time the storm had lost much of its force and it was becoming extratropical in character. There were no reports of damage.

V. *Tropical Disturbance of September 4–5.*—This storm originated in the Gulf of Mexico on the night of September 3–4. It took a northerly course and its center passed inland to the west of New Orleans on September 4 and to the east of Vicksburg, Miss., on the night of September 4–5. The highest wind reported was 45 m. p. h. about 10 a. m., September 4, at Bay St. Louis, Miss. Damage was reported in both Louisiana and Mississippi but it was small, probably less than $50,000. No lives were lost.

VI. *Caribbean Hurricane of September 21-22.*—On September 20 a rather strong easterly wave was crossing the Lesser Antilles. Two reconnaissance flights searched suspicious areas for a possible tropical storm but no closed circulation was found that day. However, during the night of September 20–21 a closed circulation centered about 100 miles south-southeast of St. Croix, Virgin Islands, developed on the wave. This followed a report from the U. S. S. *President Adams*, at 15.7° N. and 64.0° W., indicating a surface wind of 51 knots from 250°. Aircraft flying in the storm area on September 21 reported hurricane winds in the northeast quadrant; but no strong winds, other than those by the aforementioned vessel, were reported in the western quadrants. This small hurricane moved west-northwestward to the southeastern coast of the Dominican Republic and dissipated as it moved inland in the vicinity of Ciudad Trujillo.

The storm caused damages to the extent of $1,000,000 in Puerto Rico although the center did not pass over the island. The damage was mostly to the coffee industry and to buildings. No lives were lost in Puerto Rico. In the Dominican Republic only $12,000 damage was reported but 15 lives were lost.

VII. *Gulf Hurricane of September 21–22.*—A weak wave passed from the extreme northwest Caribbean Sea into the Gulf of Mexico during the morning of September 18, moving west-northwestward. Reconnaissance flights on September 19 and 20 found no evidence of a closed circulation. Reconnaissance flights on September 21, however, placed the center at latitude 26.4° N. and longitude 94.0° W., at noon. The seas were rough along the Louisiana and Texas coasts and heavy squalls occurred locally along the Texas coast September 21–23. The highest wind reported at a coastal station was 51 m. p. h. at Port Isabel. Tides along the Texas coast were generally 2 to 2.5 feet above normal. On September 23 reports by radar and by plane indicated that this hurricane had dissipated.

VIII. *Hurricane of September 23–26.*—This hurricane developed within an easterly wave which had been stagnant over the western Gulf for the previous 3 days. A center was definitely located by airborne radar at 6 p. m., September 24 at latitude 21.8° N., longitude 95.7° W., and a wind of 52 knots was reported. During the

night of September 24, the S. S. *Potrero del Llano* reported winds as high as 80 m. p. h. at latitude 20.4° N., longitude 96.7° W. The storm weakened during the 25th and by the morning of the 26th its remains had passed inland between Nautla and Vera Cruz, Mexico. Winds at Nautla during a large part of September 25 were 40–60 m. p. h. Nautla was the only coastal station that reported high winds.

IX. *Hurricane of October 1–6.*—This hurricane moved from Yucatan almost directly northward. Pressure had been abnormally low over Yucatan, Honduras, and Guatemala 2 or 3 days prior to October 1. During the night of September 30–October 1 a low pressure center passed into the Gulf of Mexico near Carmen, Mexico and increased to hurricane intensity by 10:45 a. m., October 2. The center moved inland near Freeport, Tex., during the night of October 3–4, and passed between the Airport and City Offices of the Weather Bureau at Houston, Tex., during the early morning of October 4. Winds were estimated at 135 m. p. h. 5 miles west of Freeport by the Brazos River Engineers. High tides were reported as follows: Velasco, 11.0 feet; Matagorda, 8.0 feet; Anahuac, 9.0 feet; Harrisburg (in Houston Ship Channel), 11.4 feet. Figure 3 shows the path of this hurricane over Texas. Heavy rains fell at many places. The heaviest reported was at Goodrich, Tex., where 14.50 inches fell during the storm.

Two lives were lost in this hurricane. The total damage reported amounted to $6,700,000, of which more than four-fifths was to crops. The remainder was mainly to roads and oil rigs.

X. *Hurricane of October 12–19.*—Disturbed conditions were observed in the western Caribbean Sea on October 11 and 12, and these moved over extreme western Cuba during the night of the 12th without any evidence of a center. But on October 13 a closed circulation began forming over the extreme southeastern Bahamas in the vicinity of Great Inagua and Mayaguana. The strongest winds at this time were only 30–35 m. p. h. This center moved in a north-northeast direction and increased in intensity, and at noon of October 14 aircraft reconnaissance indicated a very small center of hurricane force. The north-northeastward movement carried the center some 200 miles west of Bermuda by October 16. The next day, when several hundred miles north of Bermuda, it was blocked by high pressure and moved very slowly during the following 2 days to a position a short distance south of Sable Island on October 19. During this time it took on extra-tropical character and began to spread out and dissipate.

The strongest winds were estimated at 80 to 90 m. p. h. over most of its path but reached 100 m. p. h. about the time it reached latitude 35° N. on October 16. No damage was reported as the strong winds occurred over the ocean.

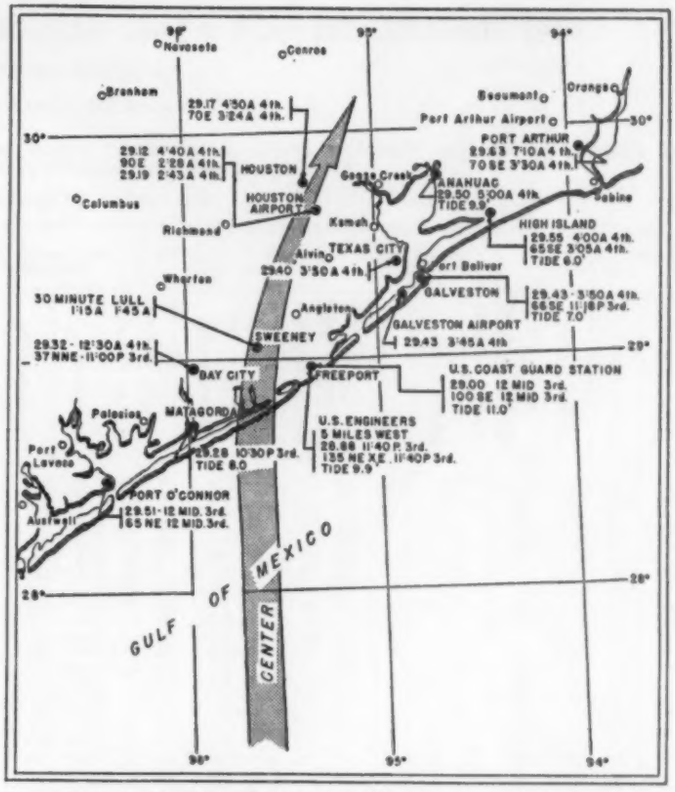



FIGURE 3.—Path of hurricane of October 1–6, 1949, as it passed inland over the Texas coast October 3 and 4. Plotted figures show extremes of wind velocity and pressure (inches) and the time of their occurrence. Maximum height of tide is shown for coastal stations.

XI. *Hurricane of November 3–4.*—The pressure began falling in the northwestern Caribbean Sea on November 2, and by morning of November 3 low pressure had become concentrated in the vicinity of Swan Island. A reconnaissance plane located a small center about 50 miles in diameter, perfectly formed with a well defined eye, about 30 miles east of Swan Island. The highest wind was estimated at 50 knots, and the lowest pressure, at 992.9 mb. (29.32 in.). It was described as very shallow in its organization. Earlier on November 3 a TACA airliner en route from San Jose to Havana had flown over the storm at 9,000 feet and described it very much as the reconnaissance plane had done. From this elevation, the entire system could be seen; the active part extended only 4,000 feet. During the night of November 3 it drifted south-southwestward into the northeastern tip of Honduras and dissipated. No damage was reported.

872637—50——2

# METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR DECEMBER 1949

## AEROLOGICAL OBSERVATIONS

[For description in Table 1 and charts, see REVIEW, January 1946, p. 6]

TABLE 1.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during December 1949*

STATIONS AND MEAN SURFACE PRESSURES

| Standard pressure surface (mb.) | Albany, N. Y. (1,013.2 mb.) | | | | Albuquerque, N. Mex. (838.4 mb.) | | | | Atlanta, Ga. (990.0 mb.) | | | | Big Spring, Tex. (930.1 mb.) | | | | Bismarck, N. Dak. (955.7 mb.) | | | | Boise, Idaho (916.6 mb.) | | | | Brownsville, Tex. (1,017.5 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 31 | 86 | −1.7 | 81 | 31 | 1,620 | 2.3 | 52 | 31 | 300 | 6.8 | 75 | 31 | 774 | 7.7 | 59 | 31 | 505 | −12.1 | 71 | 31 | 868 | 0.1 | 75 | 30 | 6 | 18.8 | 87 |
| 1,000 | 31 | 189 | −1.8 | 76 | 31 | 167 | (*) | ---- | 31 | 216 | (*) | ---- | 31 | 167 | (*) | ---- | 31 | 155 | (*) | ---- | 31 | 162 | (*) | ---- | 30 | 155 | 19.0 | 85 |
| 950 | 31 | 599 | −2.2 | 73 | 31 | 596 | (*) | ---- | 31 | 644 | 8.3 | 63 | 31 | 597 | (*) | ---- | 31 | 552 | −13.0 | 69 | 31 | 585 | (*) | ---- | 30 | 601 | 17.2 | 84 |
| 900 | 31 | 1,025 | −4.0 | 72 | 31 | 1,042 | (*) | ---- | 31 | 1,087 | 8.4 | 53 | 31 | 1,046 | 8.8 | 56 | 31 | 966 | −9.6 | 67 | 31 | 1,015 | 1.8 | 64 | 30 | 1,056 | 15.4 | 75 |
| 850 | 31 | 1,476 | −5.0 | 64 | 31 | 1,508 | (*) | ---- | 31 | 1,559 | 7.6 | 47 | 31 | 1,518 | 8.0 | 50 | 31 | 1,409 | −8.2 | 61 | 31 | 1,475 | .2 | 57 | 30 | 1,540 | 13.4 | 68 |
| 800 | 31 | 1,952 | −6.0 | 56 | 31 | 2,000 | 2.7 | 45 | 31 | 2,057 | 5.6 | 44 | 31 | 2,017 | 5.8 | 46 | 31 | 1,879 | −8.7 | 58 | 31 | 1,958 | −2.8 | 56 | 30 | 2,049 | 11.4 | 60 |
| 750 | 31 | 2,462 | −7.6 | 52 | 31 | 2,526 | −.3 | 42 | 31 | 2,588 | 3.4 | 44 | 31 | 2,550 | 4.0 | 40 | 31 | 2,388 | −9.9 | 56 | 31 | 2,472 | −5.9 | 57 | 30 | 2,591 | 9.2 | 51 |
| 700 | 31 | 2,990 | −9.8 | 50 | 31 | 3,068 | −2.8 | 38 | 31 | 3,140 | .9 | 41 | 31 | 3,100 | 1.1 | 36 | 31 | 2,908 | −12.6 | 54 | 31 | 3,004 | −9.2 | 56 | 30 | 3,155 | 6.1 | 47 |
| 650 | 30 | 3,566 | −12.5 | 50 | 31 | 3,658 | −5.9 | 37 | 31 | 3,736 | −2.1 | 36 | 31 | 3,696 | −2.6 | 32 | 31 | 3,479 | −15.7 | 51 | 31 | 3,582 | −12.5 | 54 | 30 | 3,761 | 2.1 | 46 |
| 600 | 30 | 4,167 | −15.9 | 47 | 31 | 4,273 | −10.0 | 35 | 31 | 4,364 | −5.7 | 33 | 31 | 4,322 | −6.9 | ---- | 31 | 4,070 | −19.1 | 52 | 31 | 4,180 | −15.8 | 51 | 30 | 4,400 | −1.9 | 45 |
| 550 | 30 | 4,820 | −19.8 | 48 | 31 | 4,940 | −14.4 | ---- | 31 | 5,042 | −10.2 | ---- | 31 | 4,998 | −11.2 | ---- | 31 | 4,717 | −22.9 | ---- | 31 | 4,838 | −19.7 | 48 | 30 | 5,087 | −6.0 | 39 |
| 500 | 30 | 5,518 | −23.7 | ---- | 31 | 5,654 | −19.4 | ---- | 31 | 5,768 | −14.9 | ---- | 31 | 5,721 | −16.0 | ---- | 31 | 5,405 | −27.5 | ---- | 31 | 5,533 | −24.2 | ---- | 30 | 5,827 | −10.7 | 35 |
| 450 | 30 | 6,286 | −29.2 | ---- | 31 | 6,434 | −24.8 | ---- | 31 | 6,560 | −20.4 | ---- | 31 | 6,511 | −21.5 | ---- | 31 | 6,163 | −32.7 | ---- | 31 | 6,296 | −28.9 | ---- | 30 | 6,637 | −16.2 | 36 |
| 400 | 30 | 7,110 | −34.9 | ---- | 31 | 7,276 | −30.9 | ---- | 31 | 7,417 | −27.0 | ---- | 31 | 7,365 | −27.7 | ---- | 30 | 6,974 | −38.5 | ---- | 30 | 7,124 | −34.9 | ---- | 30 | 7,505 | −22.4 | ---- |
| 350 | 29 | 8,029 | −41.0 | ---- | 30 | 8,209 | −37.7 | ---- | 31 | 8,366 | −33.9 | ---- | 31 | 8,311 | −34.5 | ---- | 30 | 7,879 | −44.8 | ---- | 29 | 8,036 | −41.4 | ---- | 30 | 8,472 | −29.3 | ---- |
| 300 | 29 | 9,062 | −47.1 | ---- | 29 | 9,251 | −45.0 | ---- | 31 | 9,428 | 41.8 | ---- | 29 | 9,368 | −42.2 | ---- | 29 | 8,899 | −51.3 | ---- | 27 | 9,074 | −48.1 | ---- | 30 | 9,554 | −37.6 | ---- |
| 250 | 28 | 10,242 | −52.8 | ---- | 28 | 10,441 | −51.8 | ---- | 31 | 10,639 | −50.3 | ---- | 29 | 10,578 | −49.9 | ---- | 27 | 10,074 | −54.8 | ---- | 25 | 10,272 | −53.8 | ---- | 30 | 10,784 | −48.0 | ---- |
| 200 | 27 | 11,663 | −56.5 | ---- | 25 | 11,853 | −57.5 | ---- | 31 | 12,067 | −58.1 | ---- | 29 | 12,012 | −56.7 | ---- | 26 | 11,502 | −53.9 | ---- | 23 | 11,699 | −55.8 | ---- | 29 | 12,220 | −58.2 | ---- |
| 175 | 26 | 12,513 | −56.9 | ---- | 22 | 12,700 | −58.5 | ---- | 31 | 12,902 | −60.8 | ---- | 29 | 12,852 | −59.0 | ---- | 22 | 12,346 | −52.6 | ---- | 19 | 12,555 | −56.0 | ---- | 29 | 13,050 | −62.8 | ---- |
| 150 | 21 | 13,468 | −57.2 | ---- | 19 | 13,661 | −58.6 | ---- | 30 | 13,857 | −62.6 | ---- | 29 | 13,814 | −61.3 | ---- | 22 | 13,339 | −53.3 | ---- | 16 | 13,526 | −55.8 | ---- | 21 | 13,999 | −65.8 | ---- |
| 125 | 12 | 14,601 | −57.4 | ---- | 12 | 14,785 | −59.9 | ---- | 26 | 14,959 | −65.7 | ---- | 26 | 14,931 | −64.7 | ---- | 12 | 14,527 | −54.4 | ---- | 9 | 14,706 | −56.2 | ---- | 18 | 15,102 | −67.6 | ---- |
| 100 | 5 | 15,983 | −55.7 | ---- | 7 | 16,170 | −61.3 | ---- | 21 | 16,315 | −68.4 | ---- | 18 | 16,291 | −66.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 11 | 16,441 | −71.6 | ---- |
| 80 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 12 | 17,624 | −68.4 | ---- | 5 | 17,638 | −66.9 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

| Standard pressure surface (mb.) | Buffalo, N. Y. (995.5 mb.) | | | | Camaguey, Cuba [1] (---- mb.) | | | | Caribou, Maine (995.9 mb.) | | | | Charleston, S. C. (1,023.3 mb.) | | | | Ciudad Victoria, Mex. (976.6 mb.) | | | | Columbia, Mo. (991.9 mb.) | | | | Dodge City, Kans. (925.7 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 31 | 221 | 0.1 | 69 | ---- | ---- | ---- | ---- | 31 | 191 | −6.9 | 80 | 31 | 18 | 9.3 | 81 | 31 | 335 | 21.4 | 60 | 31 | 239 | 2.8 | 69 | 31 | 792 | 0.4 | 63 |
| 1,000 | 31 | 183 | (*) | ---- | ---- | ---- | ---- | ---- | 31 | 158 | (*) | ---- | 31 | 210 | 12.3 | 67 | 31 | 126 | (*) | ---- | 31 | 172 | (*) | ---- | 31 | 163 | (*) | ---- |
| 950 | 31 | 596 | −1.4 | 65 | ---- | ---- | ---- | ---- | 31 | 562 | −5.8 | 76 | 31 | 645 | 11.4 | 60 | 31 | 573 | 19.7 | 61 | 31 | 592 | 3.2 | 58 | 31 | 584 | (*) | ---- |
| 900 | 31 | 1,023 | −3.5 | 66 | ---- | ---- | ---- | ---- | 31 | 983 | −6.3 | 72 | 31 | 1,091 | 9.9 | 57 | 31 | 1,037 | 16.5 | 64 | 31 | 1,026 | 2.2 | 54 | 31 | 1,020 | 4.0 | 49 |
| 850 | 30 | 1,472 | −4.8 | 64 | ---- | ---- | ---- | ---- | 31 | 1,429 | −7.6 | 65 | 31 | 1,564 | 7.9 | 50 | 31 | 1,522 | 13.9 | 67 | 31 | 1,487 | 1.1 | 48 | 31 | 1,484 | 4.1 | 37 |
| 800 | 30 | 1,948 | −6.3 | 59 | ---- | ---- | ---- | ---- | 31 | 1,899 | −9.3 | 61 | 31 | 2,063 | 5.8 | 46 | 31 | 2,031 | 11.4 | 67 | 31 | 1,973 | −.6 | 44 | 31 | 1,976 | 2.3 | 33 |
| 750 | 30 | 2,456 | −8.3 | 53 | ---- | ---- | ---- | ---- | 31 | 2,400 | −11.4 | 57 | 31 | 2,596 | 3.6 | 43 | 31 | 2,575 | 9.1 | 60 | 31 | 2,493 | −2.5 | 41 | 31 | 2,500 | −.3 | 32 |
| 700 | 30 | 2,984 | −10.6 | 50 | ---- | ---- | ---- | ---- | 31 | 2,923 | −13.3 | 48 | 31 | 3,146 | 1.2 | 36 | 31 | 3,138 | 6.2 | 57 | 31 | 3,032 | −4.7 | 39 | 31 | 3,043 | −3.5 | 31 |
| 650 | 30 | 3,556 | −13.1 | 50 | ---- | ---- | ---- | ---- | 31 | 3,490 | −15.9 | 44 | 31 | 3,746 | −1.5 | ---- | 31 | 3,741 | 2.3 | 56 | 31 | 3,619 | −7.2 | 38 | 31 | 3,630 | −7.1 | 28 |
| 600 | 30 | 4,158 | −16.1 | 47 | ---- | ---- | ---- | ---- | 30 | 4,089 | −18.7 | 41 | 31 | 4,373 | −5.2 | ---- | 29 | 4,389 | −1.3 | 44 | 31 | 4,233 | −10.5 | 34 | 31 | 4,244 | −11.0 | 26 |
| 550 | 30 | 4,808 | −19.4 | 43 | ---- | ---- | ---- | ---- | 30 | 4,732 | −22.3 | ---- | 31 | 5,054 | −9.4 | ---- | 29 | 5,076 | −5.5 | 39 | 31 | 4,900 | −14.7 | 35 | 31 | 4,908 | −15.2 | ---- |
| 500 | 30 | 5,511 | −23.9 | ---- | ---- | ---- | ---- | ---- | 30 | 5,428 | −26.5 | ---- | 31 | 5,782 | −14.5 | ---- | 29 | 5,819 | −10.1 | ---- | 31 | 5,613 | −19.7 | 35 | 31 | 5,621 | −19.9 | ---- |
| 450 | 30 | 6,275 | −29.2 | ---- | ---- | ---- | ---- | ---- | 30 | 6,187 | −31.3 | ---- | 31 | 6,576 | −20.1 | ---- | 29 | 6,629 | −15.6 | ---- | 31 | 6,390 | −25.2 | ---- | 31 | 6,397 | −25.8 | ---- |
| 400 | 30 | 7,104 | −34.8 | ---- | ---- | ---- | ---- | ---- | 30 | 7,006 | −36.5 | ---- | 31 | 7,435 | −26.6 | ---- | 29 | 7,502 | −21.8 | ---- | 31 | 7,233 | −31.6 | ---- | 31 | 7,236 | −32.5 | ---- |
| 350 | 30 | 8,025 | −40.2 | ---- | ---- | ---- | ---- | ---- | 30 | 7,921 | −41.9 | ---- | 31 | 8,385 | −33.4 | ---- | 29 | 8,471 | −29.0 | ---- | 31 | 8,164 | −38.2 | ---- | 31 | 8,164 | −39.1 | ---- |
| 300 | 29 | 9,058 | −46.1 | ---- | ---- | ---- | ---- | ---- | 30 | 8,952 | −46.6 | ---- | 31 | 9,449 | −41.3 | ---- | 28 | 9,552 | −37.7 | ---- | 31 | 9,208 | −45.5 | ---- | 31 | 9,204 | −46.2 | ---- |
| 250 | 29 | 10,254 | −51.7 | ---- | ---- | ---- | ---- | ---- | 30 | 10,150 | −50.8 | ---- | 31 | 10,663 | −50.2 | ---- | 28 | 10,781 | −47.9 | ---- | 31 | 10,402 | −53.0 | ---- | 31 | 10,395 | −53.1 | ---- |
| 200 | 28 | 11,674 | −55.8 | ---- | ---- | ---- | ---- | ---- | 25 | 11,568 | −53.3 | ---- | 30 | 12,096 | −58.4 | ---- | 27 | 12,219 | −58.5 | ---- | 28 | 11,828 | −57.4 | ---- | 31 | 11,817 | −57.1 | ---- |
| 175 | 26 | 12,520 | −56.8 | ---- | ---- | ---- | ---- | ---- | 23 | 12,430 | −53.1 | ---- | 28 | 12,935 | −61.2 | ---- | 26 | 13,048 | −63.4 | ---- | 23 | 12,689 | −59.3 | ---- | 31 | 12,661 | −57.2 | ---- |
| 150 | 24 | 13,488 | −56.1 | ---- | ---- | ---- | ---- | ---- | 22 | 13,410 | −53.2 | ---- | 27 | 13,885 | −63.3 | ---- | 26 | 13,986 | −67.1 | ---- | 20 | 13,649 | −59.8 | ---- | 31 | 13,629 | −58.6 | ---- |
| 125 | 21 | 14,640 | −57.3 | ---- | ---- | ---- | ---- | ---- | 21 | 14,583 | −54.7 | ---- | 25 | 15,006 | −66.4 | ---- | 21 | 15,086 | −70.0 | ---- | 18 | 14,777 | −62.6 | ---- | 31 | 14,770 | −61.2 | ---- |
| 100 | 15 | 16,040 | −59.9 | ---- | ---- | ---- | ---- | ---- | 10 | 16,009 | −54.9 | ---- | 20 | 16,336 | −69.4 | ---- | 19 | 16,396 | −74.4 | ---- | 14 | 16,146 | −63.2 | ---- | 25 | 16,152 | −63.5 | ---- |
| 80 | 10 | 17,456 | −60.7 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 13 | 17,670 | −70.9 | ---- | 16 | 17,685 | −74.8 | ---- | 8 | 17,504 | −64.1 | ---- | 18 | 17,509 | −62.3 | ---- |
| 60 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 9 | 19,286 | −61.2 | ---- |

| Standard pressure surface (mb.) | El Paso, Tex. (883.3 mb.) | | | | Ely, Nev. (807.5 mb.) | | | | Glasgow, Mont. (938.6 mb.) | | | | Grand Junction, Colo. (853.0 mb.) | | | | Great Falls, Mont. (883.0 mb.) | | | | Greensboro, N. C. (993.6 mb.) | | | | Hatteras, N. C. (1025.5 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 31 | 1,195 | 6.9 | 54 | 31 | 1,908 | −5.2 | 67 | 31 | 648 | −12.2 | 71 | 31 | 1,474 | −1.3 | 62 | 31 | 1,128 | −6.5 | 64 | 31 | 273 | 4.3 | 77 | 31 | 3 | 11.2 | 77 |
| 1,000 | 31 | 157 | (*) | ---- | 31 | 183 | (*) | ---- | 31 | 158 | (*) | ---- | 31 | 182 | (*) | ---- | 31 | 144 | (*) | ---- | 31 | 220 | (*) | ---- | 31 | 213 | 11.4 | 68 |
| 950 | 31 | 593 | (*) | ---- | 31 | 605 | (*) | ---- | 31 | 558 | (*) | ---- | 31 | 605 | (*) | ---- | 31 | 555 | (*) | ---- | 31 | 643 | 7.1 | 61 | 31 | 646 | 9.1 | 65 |
| 900 | 31 | 1,044 | (*) | ---- | 31 | 1,043 | (*) | ---- | 31 | 969 | −10.1 | 66 | 31 | 1,040 | (*) | ---- | 31 | 983 | (*) | ---- | 31 | 1,085 | 5.7 | 56 | 31 | 1,087 | 7.0 | 64 |
| 850 | 31 | 1,512 | 8.1 | 46 | 31 | 1,499 | (*) | ---- | 31 | 1,410 | −8.7 | 63 | 31 | 1,501 | (*) | ---- | 31 | 1,426 | −5.5 | 56 | 31 | 1,551 | 4.5 | 48 | 31 | 1,556 | 5.1 | 56 |
| 800 | 31 | 2,010 | 5.8 | 45 | 31 | 1,983 | (*) | ---- | 31 | 1,881 | −8.4 | 60 | 31 | 1,988 | .1 | 49 | 31 | 1,901 | −6.5 | 56 | 31 | 2,043 | 2.4 | 50 | 31 | 2,049 | 3.3 | 48 |
| 750 | 31 | 2,543 | 3.7 | 39 | 31 | 2,504 | −2.8 | 52 | 31 | 2,386 | −10.3 | 59 | 31 | 2,506 | −2.5 | 49 | 31 | 2,409 | −8.9 | 57 | 31 | 2,567 | .4 | 47 | 31 | 2,578 | 1.3 | 45 |
| 700 | 31 | 3,094 | .4 | 38 | 31 | 3,040 | −6.1 | 53 | 31 | 2,909 | −13.4 | 58 | 31 | 3,047 | −5.7 | 49 | 31 | 2,933 | −12.3 | 56 | 31 | 3,115 | −1.2 | 37 | 31 | 3,124 | −1.1 | 40 |
| 650 | 31 | 3,686 | −3.2 | ---- | 31 | 3,620 | −9.2 | 51 | 31 | 3,477 | −16.5 | 56 | 31 | 3,626 | −9.3 | 52 | 31 | 3,502 | −15.6 | 51 | 31 | 3,707 | −4.2 | 38 | 29 | 3,718 | −4.2 | 36 |
| 600 | 31 | 4,312 | −7.6 | ---- | 31 | 4,232 | −12.6 | 49 | 31 | 4,067 | −20.1 | 56 | 31 | 4,238 | −13.1 | 53 | 31 | 4,095 | −19.3 | 48 | 31 | 4,329 | −8.0 | 35 | 28 | 4,335 | −7.7 | ---- |
| 550 | 29 | 4,982 | −12.2 | ---- | 31 | 4,891 | −16.9 | 44 | 30 | 4,707 | −24.3 | ---- | 31 | 4,900 | −17.0 | 51 | 31 | 4,736 | −23.9 | ---- | 31 | 5,003 | −12.2 | 32 | 28 | 5,010 | −11.8 | ---- |
| 500 | 26 | 5,703 | −17.2 | ---- | 31 | 5,600 | −21.4 | ---- | 30 | 5,391 | −29.2 | ---- | 31 | 5,604 | −21.6 | ---- | 31 | 5,425 | −28.6 | ---- | 31 | 5,723 | −16.7 | ---- | 28 | 5,730 | −15.8 | ---- |
| 450 | 24 | 6,505 | −22.1 | ---- | 31 | 6,375 | −26.7 | ---- | 30 | 6,141 | −34.6 | ---- | 31 | 6,379 | −26.8 | ---- | 31 | 6,181 | −33.5 | ---- | 31 | 6,512 | −22.1 | ---- | 28 | 6,525 | −21.6 | ---- |
| 400 | 23 | 7,354 | −28.6 | ---- | 30 | 7,208 | −32.9 | ---- | 29 | 6,942 | −40.1 | ---- | 31 | 7,212 | −32.7 | ---- | 31 | 6,990 | −39.0 | ---- | 31 | 7,362 | −28.5 | ---- | 28 | 7,373 | −27.7 | ---- |
| 350 | 21 | 8,294 | −35.9 | ---- | 30 | 8,134 | −39.8 | ---- | 27 | 7,846 | −46.1 | ---- | 30 | 8,139 | −39.7 | ---- | 31 | 7,892 | −45.4 | ---- | 31 | 8,305 | −35.2 | ---- | 28 | 8,319 | −34.5 | ---- |
| 300 | 19 | 9,345 | −43.6 | ---- | 30 | 9,171 | −46.8 | ---- | 27 | 8,858 | −51.0 | ---- | 30 | 9,176 | −46.9 | ---- | 31 | 8,905 | −51.6 | ---- | 31 | 9,362 | −43.2 | ---- | 28 | 9,378 | −42.4 | ---- |
| 250 | 14 | 10,576 | −50.7 | ---- | 28 | 10,362 | −53.9 | ---- | 25 | 10,029 | −54.6 | ---- | 30 | 10,366 | −52.4 | ---- | 28 | 10,071 | −55.6 | ---- | 31 | 10,567 | −51.2 | ---- | 27 | 10,580 | −50.7 | ---- |
| 200 | 11 | 12,029 | −56.9 | ---- | 25 | 11,783 | −57.8 | ---- | 21 | 11,446 | −54.8 | ---- | 30 | 11,795 | −55.6 | ---- | 22 | 11,474 | −54.4 | ---- | 31 | 11,994 | −57.4 | ---- | 27 | 12,009 | −57.2 | ---- |
| 175 | 9 | 12,866 | −59.3 | ---- | 24 | 12,625 | −57.5 | ---- | 21 | 12,301 | −53.9 | ---- | 29 | 12,648 | −55.6 | ---- | 18 | 12,330 | −53.8 | ---- | 31 | 12,832 | −59.7 | ---- | 26 | 12,854 | −59.3 | ---- |
| 150 | 6 | 13,828 | −62.6 | ---- | 19 | 13,608 | −57.6 | ---- | 13 | 13,295 | −52.9 | ---- | 27 | 13,630 | −56.5 | ---- | 12 | 13,319 | −53.9 | ---- | 29 | 13,795 | −60.9 | ---- | 23 | 13,815 | −60.5 | ---- |
| 125 | 5 | 14,925 | −65.8 | ---- | 12 | 14,781 | −60.1 | ---- | 7 | 14,431 | −53.9 | ---- | 23 | 14,787 | −59.0 | ---- | 5 | 14,460 | −54.1 | ---- | 27 | 14,927 | −63.3 | ---- | 15 | 14,943 | −63.0 | ---- |
| 100 | ---- | ---- | ---- | ---- | 5 | 16,197 | −62.9 | ---- | ---- | ---- | ---- | ---- | 16 | 16,186 | −61.5 | ---- | ---- | ---- | ---- | ---- | 20 | 16,280 | −66.0 | ---- | 10 | 16,305 | −66.3 | ---- |
| 80 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 12 | 17,562 | −61.7 | ---- | ---- | ---- | ---- | ---- | 6 | 17,638 | −66.1 | ---- | ---- | ---- | ---- | ---- |

See footnotes at end of table, p. 344.

TABLE 1.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during December 1949*—Continued

| Standard pressure surface (mb.) | Havana, Cuba [1] (.... mb.) | | | | Honolulu, T. H. (1,012.9 mb.) | | | | International Falls, Minn. (972.9 mb.) | | | | Joliet, Ill. (998.8 mb.) | | | | Lake Charles, La. (1,021.4 mb.) | | | | Lander, Wyo. (824.9 mb.) | | | | Las Vegas, Nev. (940.1 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | .... | ..... | ..... | .... | 31 | 3 | 24.2 | 69 | 31 | 360 | −13.3 | 77 | 31 | 178 | −0.5 | 78 | 31 | 5 | 12.3 | 84 | 31 | 1,606 | −6.1 | 57 | 31 | 660 | 5.3 | 40 |
| 1,000 | .... | ..... | ..... | .... | 31 | 115 | 22.9 | 70 | 31 | 148 | (*) | .... | 31 | 167 | (*) | .... | 31 | 182 | 13.8 | 74 | 31 | 158 | (*) | .... | 31 | 148 | (*) | .... |
| 950 | .... | ..... | ..... | .... | 31 | 564 | 19.3 | 75 | 31 | 540 | −13.0 | 75 | 31 | 580 | −.2 | 66 | 31 | 620 | 13.1 | 70 | 31 | 577 | (*) | .... | 31 | 573 | (*) | .... |
| 900 | .... | ..... | ..... | .... | 31 | 1,024 | 15.8 | 79 | 31 | 952 | −13.2 | 74 | 31 | 1,011 | −1.1 | 59 | 31 | 1,069 | 11.9 | 66 | 31 | 1,009 | (*) | .... | 31 | 1,021 | 8.8 | 32 |
| 850 | .... | ..... | ..... | .... | 31 | 1,507 | 13.0 | 77 | 31 | 1,388 | −12.0 | 66 | 31 | 1,466 | −2.1 | 55 | 31 | 1,546 | 9.9 | 62 | 31 | 1,459 | (*) | .... | 31 | 1,491 | 6.2 | 33 |
| 800 | .... | ..... | ..... | .... | 31 | 2,016 | 11.3 | 60 | 31 | 1,853 | −11.3 | 59 | 31 | 1,946 | −3.8 | 52 | 31 | 2,048 | 8.0 | 54 | 31 | 1,939 | −1.8 | 45 | 31 | 1,985 | 3.1 | 36 |
| 750 | .... | ..... | ..... | .... | 31 | 2,558 | 9.6 | 36 | 31 | 2,350 | −12.7 | 50 | 30 | 2,459 | −5.7 | 47 | 31 | 2,588 | 5.9 | 49 | 31 | 2,457 | −4.3 | 41 | 31 | 2,513 | .1 | 35 |
| 700 | .... | ..... | ..... | .... | 31 | 3,123 | 6.6 | 32 | 31 | 2,871 | −15.1 | 43 | 30 | 2,993 | −8.2 | 43 | 30 | 3,141 | 3.1 | 41 | 31 | 2,990 | −7.6 | 43 | 31 | 3,055 | −2.6 | 34 |
| 650 | .... | ..... | ..... | .... | 31 | 3,729 | 2.8 | 34 | 31 | 3,436 | −17.9 | 39 | 30 | 3,568 | −11.5 | 42 | 30 | 3,742 | −.3 | 38 | 31 | 3,573 | −10.8 | 43 | 31 | 3,644 | −6.1 | 33 |
| 600 | .... | ..... | ..... | .... | 31 | 4,371 | −.9 | 33 | 31 | 4,023 | −20.9 | .... | 30 | 4,175 | −15.1 | 38 | 30 | 4,373 | −4.1 | 35 | 31 | 4,174 | −14.2 | 43 | 30 | 4,257 | −10.3 | 33 |
| 550 | .... | ..... | ..... | .... | 31 | 5,061 | −4.9 | .... | 30 | 4,664 | −24.8 | .... | 30 | 4,828 | −18.9 | .... | 30 | 5,057 | −8.5 | 36 | 31 | 4,833 | −18.5 | 42 | 30 | 4,922 | −14.6 | .... |
| 500 | .... | ..... | ..... | .... | 31 | 5,804 | −9.6 | .... | 30 | 5,349 | −29.1 | .... | 30 | 5,532 | −23.1 | .... | 30 | 5,787 | −13.2 | 36 | 31 | 5,532 | −23.7 | .... | 30 | 5,637 | −19.6 | .... |
| 450 | .... | ..... | ..... | .... | 31 | 6,615 | −15.1 | .... | 30 | 6,099 | −34.3 | .... | 29 | 6,302 | −28.1 | .... | 29 | 6,589 | −18.8 | .... | 31 | 6,298 | −29.4 | .... | 30 | 6,415 | −25.4 | .... |
| 400 | .... | ..... | ..... | .... | 31 | 7,490 | −21.0 | .... | 30 | 6,909 | −39.4 | .... | 29 | 7,132 | −33.6 | .... | 27 | 7,449 | −24.9 | .... | 31 | 7,123 | −35.8 | .... | 29 | 7,252 | −32.0 | .... |
| 350 | .... | ..... | ..... | .... | 30 | 8,463 | −28.0 | .... | 30 | 7,813 | −44.8 | .... | 29 | 8,057 | −39.9 | .... | 27 | 8,407 | −31.8 | .... | 31 | 8,036 | −43.2 | .... | 29 | 8,181 | −38.9 | .... |
| 300 | .... | ..... | ..... | .... | 30 | 9,550 | −36.2 | .... | 30 | 8,831 | −49.8 | .... | 29 | 9,095 | −46.4 | .... | 26 | 9,477 | −40.0 | .... | 31 | 9,057 | −50.2 | .... | 28 | 9,216 | −46.2 | .... |
| 250 | .... | ..... | ..... | .... | 29 | 10,792 | −45.2 | .... | 28 | 10,022 | −52.8 | .... | 27 | 10,298 | −52.6 | .... | 26 | 10,697 | −49.1 | .... | 31 | 10,230 | −55.6 | .... | 28 | 10,408 | −53.2 | .... |
| 200 | .... | ..... | ..... | .... | 29 | 12,246 | −55.7 | .... | 26 | 11,459 | −52.3 | .... | 26 | 11,728 | −57.8 | .... | 25 | 12,130 | −58.9 | .... | 30 | 11,642 | −56.0 | .... | 24 | 11,825 | −57.3 | .... |
| 175 | .... | ..... | ..... | .... | 28 | 13,087 | −60.0 | .... | 24 | 12,330 | −52.3 | .... | 25 | 12,573 | −58.7 | .... | 25 | 12,959 | −62.6 | .... | 30 | 12,492 | −55.4 | .... | 23 | 12,671 | −58.2 | .... |
| 150 | .... | ..... | ..... | .... | 25 | 14,050 | −64.7 | .... | 23 | 13,325 | −52.3 | .... | 21 | 13,561 | −59.5 | .... | 23 | 13,898 | −64.9 | .... | 29 | 13,478 | −55.4 | .... | 18 | 13,652 | −58.9 | .... |
| 125 | .... | ..... | ..... | .... | 22 | 15,150 | −69.8 | .... | 17 | 14,527 | −53.2 | .... | 19 | 14,700 | −60.1 | .... | 16 | 15,006 | −66.7 | .... | 25 | 14,645 | −56.8 | .... | 15 | 14,788 | −60.8 | .... |
| 100 | .... | ..... | ..... | .... | 16 | 16,467 | −74.8 | .... | 12 | 15,960 | −53.7 | .... | 10 | 16,079 | −60.0 | .... | 12 | 16,350 | −70.0 | .... | 21 | 16,051 | −58.8 | .... | 12 | 16,164 | −63.2 | .... |
| 80 | .... | ..... | ..... | .... | 10 | 17,762 | −73.1 | .... | 8 | 17,399 | −54.7 | .... | 6 | 17,466 | −60.0 | .... | 7 | 17,656 | −71.8 | .... | 13 | 17,449 | −58.4 | .... | 6 | 17,550 | −60.7 | .... |
| 60 | .... | ..... | ..... | .... | 5 | 19,478 | −67.6 | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | 6 | 19,278 | −58.8 | .... | .... | ..... | ..... | .... |

| | Little Rock, Ark. (1,013.3 mb.) | | | | Mazatlan, Mex. (1,011.2 mb.) | | | | Medford, Oreg. (972.1 mb.) | | | | Merida, Mex. (1,014.1 mb.) | | | | Miami, Fla. (1,020.1 mb.) | | | | Nantucket, Mass. (1,022.2 mb.) | | | | Nashville, Tenn. (1,003.1 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface | 31 | 79 | 7.0 | 74 | 31 | 14 | 21.9 | 78 | 31 | 401 | 3.0 | 87 | 31 | 27 | 23.0 | 78 | 31 | 4 | 21.0 | 78 | 31 | 14 | 3.9 | 72 | 31 | 177 | 6.1 | 70 |
| 1,000 | 31 | 188 | 9.3 | 63 | 31 | 110 | 21.8 | 71 | 31 | 170 | (*) | .... | 31 | 149 | 22.6 | 78 | 31 | 176 | 21.2 | 74 | 31 | 192 | 4.6 | 72 | 31 | 202 | 6.1 | 62 |
| 950 | 31 | 616 | 8.4 | 58 | 31 | 568 | 23.0 | 51 | 31 | 591 | 3.2 | 79 | 31 | 595 | 20.6 | 74 | 31 | 617 | 18.1 | 77 | 31 | 614 | 2.5 | 70 | 31 | 628 | 6.4 | 57 |
| 900 | 31 | 1,059 | 7.5 | 51 | 31 | 1,028 | 20.7 | 48 | 31 | 1,025 | 2.4 | 71 | 31 | 1,061 | 17.7 | 74 | 31 | 1,081 | 14.7 | 79 | 31 | 1,045 | .2 | 65 | 31 | 1,067 | 5.7 | 45 |
| 850 | 31 | 1,528 | 6.4 | 46 | 31 | 1,519 | 17.6 | 42 | 31 | 1,485 | .6 | 61 | 31 | 1,548 | 14.3 | 76 | 31 | 1,562 | 11.6 | 78 | 31 | 1,502 | −1.0 | 55 | 31 | 1,543 | 4.5 | 42 |
| 800 | 31 | 2,024 | 5.0 | 46 | 31 | 2,034 | 14.1 | 42 | 31 | 1,969 | −2.4 | 61 | 31 | 2,058 | 11.6 | 69 | 31 | 2,069 | 10.7 | 50 | 31 | 1,985 | −2.4 | 43 | 31 | 2,026 | 2.6 | 40 |
| 750 | 31 | 2,553 | 2.6 | 46 | 31 | 2,585 | 10.1 | 47 | 31 | 2,487 | −4.6 | 58 | 31 | 2,600 | 10.1 | 49 | 31 | 2,610 | 9.1 | 37 | 31 | 2,502 | −4.2 | 40 | 31 | 2,533 | .4 | 41 |
| 700 | 31 | 3,104 | .2 | 41 | 31 | 3,145 | 6.0 | 50 | 31 | 3,020 | −7.1 | 53 | 31 | 3,169 | 7.6 | 34 | 31 | 3,174 | 6.3 | 33 | 31 | 3,037 | −6.3 | 35 | 31 | 3,098 | −1.6 | 40 |
| 650 | 31 | 3,698 | −2.7 | .... | 29 | 3,753 | 2.2 | 50 | 31 | 3,601 | −10.3 | 52 | 31 | 3,779 | 4.8 | .... | 31 | 3,780 | 3.1 | 32 | 30 | 3,620 | −8.7 | .... | 30 | 3,689 | −4.6 | 40 |
| 600 | 31 | 4,325 | −6.7 | .... | 29 | 4,392 | −1.5 | 41 | 31 | 4,207 | −13.8 | 50 | 30 | 4,424 | 1.6 | .... | 30 | 4,423 | −.4 | .... | 30 | 4,231 | −12.2 | .... | 30 | 4,311 | −7.9 | .... |
| 550 | 30 | 5,000 | −11.6 | .... | 29 | 5,083 | −5.8 | 41 | 31 | 4,868 | −18.0 | 48 | 30 | 5,115 | −2.6 | .... | 30 | 5,115 | −4.5 | .... | 30 | 4,892 | −16.4 | .... | 30 | 4,984 | −12.0 | .... |
| 500 | 30 | 5,721 | −16.1 | .... | 28 | 5,819 | −10.7 | 44 | 31 | 5,569 | −22.6 | .... | 30 | 5,809 | −7.7 | .... | 30 | 5,858 | −9.3 | .... | 30 | 5,599 | −21.2 | .... | 30 | 5,705 | −16.8 | .... |
| 450 | 30 | 6,513 | −21.6 | .... | 27 | 6,632 | −16.0 | 45 | 31 | 6,342 | −27.8 | .... | 29 | 6,682 | −13.8 | .... | 28 | 6,669 | −15.1 | .... | 29 | 6,376 | −26.0 | .... | 29 | 6,497 | −22.4 | .... |
| 400 | 30 | 7,365 | −27.7 | .... | 26 | 7,499 | −22.1 | .... | 30 | 7,164 | −33.9 | .... | 29 | 7,563 | −20.3 | .... | 28 | 7,542 | −21.6 | .... | 29 | 7,212 | −31.7 | .... | 29 | 7,343 | −28.7 | .... |
| 350 | 29 | 8,312 | −35.0 | .... | 25 | 8,466 | −29.1 | .... | 29 | 8,094 | −40.4 | .... | 29 | 8,536 | −28.3 | .... | 27 | 8,516 | −28.7 | .... | 28 | 8,149 | −37.6 | .... | 29 | 8,285 | −35.8 | .... |
| 300 | 28 | 9,367 | −43.0 | .... | 25 | 9,550 | −37.5 | .... | 27 | 9,125 | −48.0 | .... | 29 | 9,620 | −37.2 | .... | 27 | 9,600 | −37.1 | .... | 28 | 9,197 | −44.1 | .... | 29 | 9,339 | −43.7 | .... |
| 250 | 26 | 10,576 | −51.3 | .... | 25 | 10,782 | −47.5 | .... | 23 | 10,301 | −54.6 | .... | 28 | 10,850 | −47.3 | .... | 26 | 10,833 | −46.5 | .... | 28 | 10,400 | −51.3 | .... | 29 | 10,542 | −51.7 | .... |
| 200 | 26 | 12,003 | −57.2 | .... | 24 | 12,221 | −58.9 | .... | 17 | 11,741 | −59.3 | .... | 27 | 12,291 | −58.0 | .... | 26 | 12,281 | −56.0 | .... | 24 | 11,842 | −55.8 | .... | 28 | 11,968 | −58.1 | .... |
| 175 | 25 | 12,842 | −59.2 | .... | 23 | 13,048 | −64.0 | .... | 11 | 12,608 | −59.9 | .... | 27 | 13,122 | −63.2 | .... | 25 | 13,121 | −60.5 | .... | 18 | 12,688 | −56.5 | .... | 27 | 12,799 | −59.9 | .... |
| 150 | 20 | 13,797 | −61.6 | .... | 21 | 13,996 | −66.5 | .... | 5 | 13,577 | −59.1 | .... | 27 | 14,059 | −67.7 | .... | 24 | 14,072 | −64.5 | .... | 13 | 13,677 | −57.2 | .... | 26 | 13,751 | −61.1 | .... |
| 125 | 13 | 14,918 | −63.9 | .... | 18 | 15,088 | −69.9 | .... | .... | ..... | ..... | .... | 25 | 15,137 | −72.2 | .... | 23 | 15,176 | −68.4 | .... | 8 | 14,810 | −58.3 | .... | 21 | 14,872 | −63.6 | .... |
| 100 | 6 | 16,292 | −67.7 | .... | 15 | 16,408 | −72.9 | .... | .... | ..... | ..... | .... | 20 | 16,429 | −77.7 | .... | 17 | 16,504 | −73.6 | .... | .... | ..... | ..... | .... | 11 | 16,252 | −66.7 | .... |
| 80 | .... | ..... | ..... | .... | 8 | 17,702 | −73.8 | .... | .... | ..... | ..... | .... | 11 | 17,702 | −78.4 | .... | 7 | 17,835 | −75.7 | .... | .... | ..... | ..... | .... | 9 | 17,613 | −66.5 | .... |
| 60 | .... | ..... | ..... | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | 5 | 19,339 | −64.1 | .... |

| | New Orleans, La. (1,022.6 mb.) | | | | North Platte, Nebr. (916.8 mb.) | | | | Oakland, Calif. (1,018.3 mb.) | | | | Oklahoma City, Okla. (974.0 mb.) | | | | Omaha, Nebr. (982.1 mb.) | | | | Phoenix, Ariz. (976.7 mb.) | | | | Pittsburgh, Pa. (977.8 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface | 30 | 2 | 13.8 | 81 | 31 | 849 | −3.2 | 72 | 31 | 6 | 9.1 | 75 | 31 | 391 | 4.5 | 68 | 31 | 308 | −0.2 | 63 | 31 | 339 | 9.7 | 63 | 31 | 382 | 1.6 | 68 |
| 1,000 | 30 | 191 | 15.1 | 71 | 31 | 150 | (*) | .... | 31 | 156 | 10.1 | 70 | 31 | 174 | (*) | .... | 31 | 161 | (*) | .... | 31 | 140 | (*) | .... | 31 | 199 | (*) | .... |
| 950 | 30 | 629 | 14.1 | 65 | 31 | 564 | (*) | .... | 31 | 585 | 8.8 | 58 | 31 | 597 | 6.6 | 58 | 31 | 575 | −.8 | 57 | 31 | 578 | 14.7 | 37 | 31 | 620 | 2.2 | 62 |
| 900 | 30 | 1,081 | 12.5 | 59 | 31 | 996 | −.1 | 57 | 31 | 1,029 | 7.6 | 48 | 31 | 1,038 | 5.9 | 51 | 31 | 1,004 | −1.2 | 54 | 31 | 1,027 | 12.0 | 34 | 31 | 1,049 | .6 | 59 |
| 850 | 30 | 1,559 | 10.8 | 56 | 31 | 1,456 | .9 | 45 | 31 | 1,498 | 5.7 | 45 | 31 | 1,507 | 4.8 | 50 | 31 | 1,459 | −1.1 | 51 | 31 | 1,502 | 8.7 | 36 | 31 | 1,507 | −1.2 | 57 |
| 800 | 30 | 2,063 | 9.0 | 49 | 31 | 1,941 | −1.2 | 42 | 31 | 1,992 | 3.3 | 42 | 31 | 1,998 | 3.2 | 46 | 31 | 1,942 | −2.6 | 48 | 31 | 2,000 | 5.4 | 36 | 31 | 1,995 | −3.1 | 55 |
| 750 | 30 | 2,601 | 6.5 | 42 | 31 | 2,455 | −3.9 | 42 | 31 | 2,520 | .8 | 37 | 31 | 2,524 | 1.3 | 38 | 31 | 2,457 | −4.7 | 45 | 31 | 2,534 | 2.3 | 36 | 31 | 2,505 | −4.8 | 46 |
| 700 | 29 | 3,158 | 3.7 | 39 | 31 | 2,994 | −7.4 | 41 | 31 | 3,064 | −2.4 | 37 | 31 | 3,072 | −1.5 | 36 | 31 | 2,992 | −7.5 | 41 | 31 | 3,078 | −1.1 | 34 | 31 | 3,037 | −7.2 | 43 |
| 650 | 29 | 3,762 | .3 | .... | 31 | 3,571 | −10.8 | 42 | 31 | 3,654 | −5.7 | 35 | 31 | 3,663 | −4.6 | 34 | 31 | 3,572 | −10.5 | 40 | 31 | 3,669 | −4.7 | 30 | 31 | 3,619 | −10.0 | 43 |
| 600 | 29 | 4,393 | −3.3 | .... | 31 | 4,179 | −14.0 | 39 | 30 | 4,271 | −9.5 | 31 | 31 | 4,285 | −8.1 | .... | 31 | 4,178 | −13.8 | 38 | 30 | 4,290 | −8.6 | .... | 31 | 4,225 | −13.1 | 38 |
| 550 | 28 | 5,076 | −7.4 | .... | 31 | 4,836 | −18.2 | 36 | 30 | 4,941 | −14.1 | .... | 31 | 4,954 | −12.8 | .... | 31 | 4,840 | −17.8 | 36 | 30 | 4,963 | −12.8 | .... | 31 | 4,889 | −16.8 | .... |
| 500 | 28 | 5,811 | −12.2 | .... | 31 | 5,539 | −23.0 | .... | 30 | 5,655 | −19.1 | .... | 31 | 5,675 | −17.9 | .... | 31 | 5,541 | −22.2 | .... | 30 | 5,679 | −17.9 | .... | 31 | 5,593 | −21.1 | .... |
| 450 | 28 | 6,614 | −17.9 | .... | 31 | 6,304 | −28.6 | .... | 29 | 6,442 | −24.9 | .... | 31 | 6,457 | −23.2 | .... | 31 | 6,314 | −27.8 | .... | 30 | 6,463 | −23.6 | .... | 30 | 6,364 | −25.9 | .... |
| 400 | 28 | 7,478 | −24.2 | .... | 31 | 7,135 | −34.9 | .... | 29 | 7,280 | −31.3 | .... | 31 | 7,307 | −29.5 | .... | 31 | 7,144 | −34.1 | .... | 30 | 7,307 | −30.2 | .... | 28 | 7,202 | −31.5 | .... |
| 350 | 28 | 8,437 | −31.4 | .... | 31 | 8,053 | −41.5 | .... | 29 | 8,211 | −38.5 | .... | 31 | 8,245 | −36.5 | .... | 31 | 8,067 | −40.5 | .... | 30 | 8,242 | −37.3 | .... | 28 | 8,135 | −37.6 | .... |
| 300 | 28 | 9,511 | −39.5 | .... | 31 | 9,083 | −48.2 | .... | 28 | 9,247 | −46.4 | .... | 30 | 9,294 | −44.2 | .... | 31 | 9,101 | −47.7 | .... | 30 | 9,289 | −44.6 | .... | 25 | 9,195 | −45.0 | .... |
| 250 | 28 | 10,731 | −48.9 | .... | 31 | 10,268 | −53.7 | .... | 28 | 10,436 | −54.4 | .... | 29 | 10,494 | −52.2 | .... | 31 | 10,288 | −53.3 | .... | 29 | 10,497 | −51.3 | .... | 23 | 10,389 | −52.4 | .... |
| 200 | 26 | 12,162 | −57.8 | .... | 30 | 11,691 | −56.7 | .... | 26 | 11,855 | −58.2 | .... | 27 | 11,921 | −57.4 | .... | 31 | 11,714 | −55.8 | .... | 29 | 11,927 | −56.5 | .... | 19 | 11,836 | −58.7 | .... |
| 175 | 26 | 12,996 | −61.5 | .... | 28 | 12,538 | −57.1 | .... | 24 | 12,702 | −58.2 | .... | 26 | 12,760 | −57.9 | .... | 30 | 12,567 | −56.3 | .... | 29 | 12,771 | −57.5 | .... | 16 | 12,672 | −59.0 | .... |
| 150 | 26 | 13,944 | −64.3 | .... | 28 | 13,511 | −57.5 | .... | 14 | 13,670 | −58.1 | .... | 22 | 13,730 | −60.0 | .... | 27 | 13,539 | −57.0 | .... | 28 | 13,744 | −59.1 | .... | 15 | 13,641 | −59.3 | .... |
| 125 | 23 | 15,047 | −67.0 | .... | 25 | 14,655 | −58.0 | .... | 11 | 14,829 | −59.8 | .... | 14 | 14,855 | −64.0 | .... | 27 | 14,689 | −58.2 | .... | 20 | 14,877 | −62.3 | .... | 8 | 14,773 | −60.6 | .... |
| 100 | 18 | 16,395 | −70.3 | .... | 23 | 16,057 | −59.9 | .... | 6 | 16,223 | −60.9 | .... | 7 | 16,180 | −69.0 | .... | 21 | 16,078 | −60.0 | .... | 14 | 16,254 | −64.6 | .... | 5 | 16,178 | −63.5 | .... |
| 80 | 10 | 17,727 | −70.2 | .... | 19 | 17,442 | −60.7 | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | 17 | 17,476 | −60.9 | .... | 6 | 17,673 | −64.5 | .... | .... | ..... | ..... | .... |
| 60 | .... | ..... | ..... | .... | 12 | 19,237 | −59.3 | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | 8 | 19,265 | −59.2 | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... |
| 50 | .... | ..... | ..... | .... | 5 | 20,372 | −60.1 | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... | .... | ..... | ..... | .... |

See footnotes at end of table, p. 344.

TABLE 1.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during December 1949*—Continued

| Standard pressure surface (mb.) | Portland, Maine (1,019.8 mb.) | | | | Rapid City, S. Dak. (900.2 mb.) | | | | St. Cloud, Minn. (979.1 mb.) | | | | San Antonio, Tex. (992.4 mb.) | | | | San Juan, P. R. (1,012.1 mb.) | | | | Santa Maria, Calif. (1,009.5 mb.) | | | | Sault Ste. Marie, Mich. (991.2 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 31 | 20 | −2.0 | 81 | 31 | 980 | −7.1 | 65 | 31 | 317 | −8.5 | 77 | 31 | 240 | 12.6 | 83 | 31 | 19 | 23.8 | 84 | 31 | 71 | 9.6 | 74 | 31 | 221 | −5.1 | 78 |
| 1,000 | 31 | 176 | −.5 | 72 | 31 | 147 | (*) | ---- | 31 | 151 | (*) | ---- | 31 | 174 | (*) | ---- | 31 | 124 | 23.8 | 79 | 31 | 149 | 11.3 | 65 | 31 | 151 | (*) | ---- |
| 950 | 31 | 590 | −1.8 | 67 | 31 | 559 | (*) | ---- | 31 | 554 | −8.5 | 74 | 31 | 611 | 13.5 | 73 | 31 | 573 | 20.6 | 81 | 31 | 579 | 11.4 | 49 | 31 | 556 | −6.5 | 78 |
| 900 | 31 | 1,014 | −3.2 | 67 | 31 | 983 | (*) | ---- | 31 | 969 | −8.4 | 67 | 31 | 1,062 | 11.8 | 71 | 31 | 1,037 | 17.3 | 81 | 31 | 1,029 | 9.8 | 40 | 31 | 974 | −8.3 | 79 |
| 850 | 31 | 1,465 | −4.7 | 61 | 31 | 1,434 | −1.9 | 51 | 31 | 1,413 | −7.5 | 55 | 31 | 1,539 | 10.0 | 68 | 31 | 1,524 | 14.2 | 80 | 31 | 1,501 | 7.1 | 36 | 31 | 1,416 | −9.5 | 73 |
| 800 | 31 | 1,941 | −6.0 | 51 | 31 | 1,915 | −3.6 | 51 | 31 | 1,885 | −8.0 | 48 | 31 | 2,042 | 8.3 | 59 | 31 | 2,035 | 11.6 | 77 | 31 | 1,998 | 5.0 | 33 | 31 | 1,883 | −11.0 | 64 |
| 750 | 31 | 2,451 | −7.8 | 44 | 31 | 2,425 | −5.7 | 54 | 31 | 2,391 | −9.5 | 41 | 31 | 2,577 | 6.3 | 50 | 31 | 2,578 | 9.1 | 70 | 31 | 2,526 | 2.5 | 30 | 31 | 2,382 | −12.2 | 58 |
| 700 | 31 | 2,979 | −10.3 | ---- | 31 | 2,960 | −9.0 | 53 | 31 | 2,916 | −12.0 | 41 | 31 | 3,136 | 3.7 | 41 | 31 | 3,141 | 6.4 | 59 | 31 | 3,076 | −.3 | 27 | 31 | 2,903 | −14.2 | 54 |
| 650 | 30 | 3,546 | −13.2 | ---- | 31 | 3,534 | −12.3 | 51 | 31 | 3,489 | −15.1 | 40 | 31 | 3,734 | .3 | 38 | 31 | 3,751 | 3.2 | 48 | 31 | 3,672 | −3.8 | ---- | 31 | 3,468 | −16.6 | 53 |
| 600 | 30 | 4,147 | −16.2 | ---- | 31 | 4,138 | −15.6 | 49 | 31 | 4,081 | −18.4 | 44 | 31 | 4,370 | −3.9 | 41 | 31 | 4,392 | .0 | 37 | 31 | 4,292 | −7.8 | ---- | 31 | 4,060 | −19.8 | 51 |
| 550 | 30 | 4,801 | −20.0 | ---- | 31 | 4,791 | −19.9 | 49 | 31 | 4,725 | −22.4 | ---- | 31 | 5,051 | −8.3 | 42 | 31 | 5,085 | −3.6 | 37 | 30 | 4,964 | −12.4 | ---- | 31 | 4,702 | −23.5 | ---- |
| 500 | 30 | 5,498 | −24.7 | ---- | 31 | 5,491 | −24.7 | ---- | 31 | 5,419 | −26.5 | ---- | 31 | 5,783 | −13.5 | 44 | 31 | 5,831 | −8.2 | 37 | 29 | 5,678 | −17.6 | ---- | 31 | 5,392 | −27.7 | ---- |
| 450 | 30 | 6,263 | −30.2 | ---- | 31 | 6,255 | −29.9 | ---- | 31 | 6,177 | −31.3 | ---- | 31 | 6,585 | −18.6 | 41 | 31 | 6,647 | −13.6 | ---- | 29 | 6,465 | −23.6 | ---- | 31 | 6,150 | −32.7 | ---- |
| 400 | 30 | 7,085 | −35.8 | ---- | 31 | 7,079 | −36.0 | ---- | 31 | 6,999 | −36.8 | ---- | 31 | 7,446 | −25.0 | ---- | 30 | 7,525 | −20.0 | ---- | 29 | 7,307 | −30.3 | ---- | 31 | 6,964 | −38.1 | ---- |
| 350 | 30 | 8,001 | −41.5 | ---- | 31 | 7,993 | −42.9 | ---- | 31 | 7,911 | −42.8 | ---- | 31 | 8,404 | −31.6 | ---- | 30 | 8,502 | −26.6 | ---- | 29 | 8,242 | −37.4 | ---- | 31 | 7,871 | −43.7 | ---- |
| 300 | 29 | 9,032 | −47.1 | ---- | 31 | 9,015 | −49.9 | ---- | 29 | 8,935 | −48.4 | ---- | 31 | 9,476 | −39.5 | ---- | 29 | 9,599 | −34.7 | ---- | 28 | 9,292 | −45.4 | ---- | 31 | 8,895 | −48.6 | ---- |
| 250 | 29 | 10,225 | −52.7 | ---- | 31 | 10,192 | −54.5 | ---- | 27 | 10,129 | −52.8 | ---- | 29 | 10,701 | −48.2 | ---- | 29 | 10,848 | −44.1 | ---- | 27 | 10,483 | −53.6 | ---- | 30 | 10,077 | −52.7 | ---- |
| 200 | 28 | 11,650 | −55.2 | ---- | 30 | 11,614 | −55.0 | ---- | 26 | 11,563 | −53.5 | ---- | 23 | 12,146 | −57.0 | ---- | 28 | 12,310 | −54.7 | ---- | 22 | 11,917 | −58.5 | ---- | 27 | 11,509 | −54.3 | ---- |
| 175 | 27 | 12,491 | −54.7 | ---- | 26 | 12,453 | −53.5 | ---- | 24 | 12,411 | −53.1 | ---- | 21 | 12,984 | −60.3 | ---- | 27 | 13,150 | −60.6 | ---- | 14 | 12,778 | −59.2 | ---- | 27 | 12,365 | −54.0 | ---- |
| 150 | 24 | 13,453 | −55.7 | ---- | 26 | 13,443 | −53.8 | ---- | 23 | 13,396 | −53.7 | ---- | 16 | 13,931 | −63.6 | ---- | 25 | 14,008 | −66.3 | ---- | 11 | 13,774 | −60.8 | ---- | 26 | 13,353 | −53.6 | ---- |
| 125 | 19 | 14,604 | −57.6 | ---- | 22 | 14,605 | −55.3 | ---- | 13 | 14,545 | −54.6 | ---- | 10 | 15,058 | −66.5 | ---- | 23 | 15,188 | −71.9 | ---- | 5 | 14,870 | −63.2 | ---- | 21 | 14,514 | −54.5 | ---- |
| 100 | 15 | 16,023 | −58.6 | ---- | 12 | 16,029 | −56.1 | ---- | 8 | 15,984 | −57.7 | ---- | 5 | 16,400 | −70.5 | ---- | 17 | 16,477 | −77.0 | ---- | ---- | ---- | ---- | ---- | 10 | 15,913 | −56.0 | ---- |
| 80 | 7 | 17,398 | −59.3 | ---- | 10 | 17,468 | −56.6 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 10 | 17,742 | −78.2 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

| Standard pressure surface (mb.) | Spokane, Wash. (929.2 mb.) | | | | Swan Island, W. I. (1,013.8 mb.) | | | | Tacubaya, Mex. (774.5 mb.) | | | | Tampa, Fla. (1,021.5 mb.) | | | | Tatoosh Island, Wash. (1,009.3 mb.) | | | | Toledo, Ohio (998.7 mb.) | | | | Washington, D. C. (1,023.4 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 31 | 721 | −1.5 | 80 | 31 | 10 | 25.0 | 79 | 31 | 2,306 | 14.4 | 47 | 31 | 9 | 17.1 | 79 | 31 | 31 | 5.6 | 80 | 31 | 191 | 0.2 | 77 | 31 | 25 | 5.0 | 66 |
| 1,000 | 31 | 131 | (*) | ---- | 31 | 130 | 24.2 | 79 | 31 | 82 | (*) | ---- | 31 | 191 | 18.0 | 72 | 31 | 106 | (*) | ---- | 31 | 179 | (*) | ---- | 31 | 213 | 4.8 | 60 |
| 950 | 31 | 546 | (*) | ---- | 31 | 577 | 21.0 | 81 | 31 | 542 | (*) | ---- | 31 | 630 | 16.1 | 69 | 31 | 524 | 2.9 | 74 | 31 | 595 | .2 | 65 | 31 | 633 | 3.4 | 60 |
| 900 | 31 | 975 | −1.3 | 73 | 31 | 1,045 | 17.8 | 82 | 31 | 1,019 | (*) | ---- | 31 | 1,088 | 13.6 | 69 | 31 | 959 | .1 | 76 | 31 | 1,023 | −1.2 | 61 | 31 | 1,068 | 2.2 | 66 |
| 850 | 31 | 1,429 | −3.2 | 69 | 31 | 1,533 | 14.7 | 80 | 31 | 1,508 | (*) | ---- | 31 | 1,568 | 11.2 | 62 | 31 | 1,415 | −2.5 | 76 | 31 | 1,477 | −2.5 | 58 | 31 | 1,528 | .6 | 51 |
| 800 | 31 | 1,907 | −5.9 | 65 | 31 | 2,044 | 12.1 | 71 | 31 | 2,033 | (*) | ---- | 31 | 2,073 | 10.0 | 45 | 31 | 1,894 | −4.7 | 69 | 31 | 1,957 | −3.8 | 53 | 31 | 2,014 | −1.2 | 50 |
| 750 | 31 | 2,413 | −8.5 | 56 | 31 | 2,585 | 9.9 | 56 | 31 | 2,580 | 13.4 | 46 | 31 | 2,609 | 7.7 | 35 | 31 | 2,405 | −7.1 | 61 | 31 | 2,468 | −6.3 | 51 | 31 | 2,534 | −2.8 | 46 |
| 700 | 31 | 2,942 | −11.5 | 51 | 31 | 3,154 | 8.2 | 39 | 31 | 3,155 | 9.3 | 50 | 31 | 3,173 | 4.9 | 34 | 31 | 2,935 | −10.2 | 61 | 31 | 3,002 | −8.8 | 52 | 31 | 3,071 | −5.3 | 48 |
| 650 | 31 | 3,511 | −15.1 | 51 | 31 | 3,764 | 5.2 | ---- | 31 | 3,769 | 4.8 | 55 | 31 | 3,776 | 1.7 | 34 | 31 | 3,510 | −13.3 | 59 | 31 | 3,581 | −11.2 | 45 | 31 | 3,656 | −7.9 | 42 |
| 600 | 31 | 4,107 | −18.5 | 54 | 31 | 4,413 | 1.7 | ---- | 31 | 4,414 | .5 | 54 | 31 | 4,414 | −2.1 | 32 | 31 | 4,107 | −16.9 | 55 | 31 | 4,184 | −14.2 | 40 | 31 | 4,268 | −11.6 | ---- |
| 550 | 30 | 4,747 | −22.5 | ---- | 30 | 5,103 | −2.4 | ---- | 31 | 5,111 | −3.3 | 37 | 31 | 5,101 | −6.1 | 31 | 31 | 4,755 | −21.0 | -- | 31 | 4,843 | −18.4 | ---- | 31 | 4,935 | −15.6 | ---- |
| 500 | 29 | 5,440 | −27.1 | ---- | 30 | 5,857 | −7.0 | ---- | 31 | 5,855 | −7.8 | ---- | 31 | 5,840 | −10.9 | 30 | 31 | 5,451 | −25.4 | ---- | 31 | 5,543 | −22.9 | ---- | 31 | 5,643 | −20.3 | ---- |
| 450 | 29 | 6,196 | −32.1 | ---- | 30 | 6,677 | −12.8 | ---- | 30 | 6,677 | −13.6 | ---- | 31 | 6,646 | −16.5 | 30 | 31 | 6,211 | −30.6 | ---- | 30 | 6,316 | −28.1 | ---- | 31 | 6,421 | −25.3 | ---- |
| 400 | 29 | 7,014 | −37.6 | ---- | 30 | 7,558 | −19.3 | ---- | 29 | 7,551 | −19.9 | ---- | 31 | 7,516 | −23.1 | ---- | 31 | 7,038 | −35.5 | ---- | 30 | 7,148 | −33.7 | ---- | 31 | 7,262 | −30.4 | ---- |
| 350 | 28 | 7,917 | −44.0 | ---- | 30 | 8,536 | −26.8 | ---- | 27 | 8,530 | −27.8 | ---- | 29 | 8,480 | −30.1 | ---- | 31 | 7,955 | −41.4 | ---- | 29 | 8,065 | −40.2 | ---- | 31 | 8,197 | −36.9 | ---- |
| 300 | 26 | 8,931 | −50.4 | ---- | 30 | 9,628 | −36.0 | ---- | 24 | 9,624 | −36.6 | ---- | 29 | 9,559 | −38.4 | ---- | 31 | 8,986 | −47.7 | ---- | 29 | 9,101 | −46.3 | ---- | 29 | 9,243 | −44.3 | ---- |
| 250 | 25 | 10,101 | −54.1 | ---- | 29 | 10,872 | −45.0 | ---- | 24 | 10,900 | −47.0 | ---- | 29 | 10,787 | −47.7 | ---- | 31 | 10,173 | −53.4 | ---- | 27 | 10,282 | −53.3 | ---- | 29 | 10,443 | −51.8 | ---- |
| 200 | 21 | 11,515 | −53.2 | ---- | 28 | 12,328 | −55.6 | ---- | 23 | 12,304 | −58.4 | ---- | 26 | 12,232 | −56.4 | ---- | 26 | 11,609 | −53.4 | ---- | 21 | 11,714 | −56.7 | ---- | 28 | 11,859 | −56.8 | ---- |
| 175 | 14 | 12,383 | −51.7 | ---- | 27 | 13,169 | −60.8 | ---- | 22 | 13,136 | −63.8 | ---- | 24 | 13,066 | −60.9 | ---- | 17 | 12,478 | −52.1 | ---- | 16 | 12,566 | −57.3 | ---- | 28 | 12,701 | −58.3 | ---- |
| 150 | 9 | 13,395 | −52.4 | ---- | 27 | 14,115 | −66.4 | ---- | 20 | 14,068 | −68.5 | ---- | 23 | 14,011 | −64.8 | ---- | 16 | 13,482 | −52.5 | ---- | 14 | 13,541 | −58.0 | ---- | 26 | 13,676 | −59.7 | ---- |
| 125 | 6 | 14,583 | −54.1 | ---- | 15 | 15,207 | −72.2 | ---- | 19 | 15,150 | −71.7 | ---- | 19 | 15,117 | −68.8 | ---- | 10 | 14,610 | −52.6 | ---- | 12 | 14,705 | −60.0 | ---- | 21 | 14,800 | −62.2 | ---- |
| 100 | ---- | ---- | ---- | ---- | 9 | 16,500 | −77.8 | ---- | 17 | 16,452 | −76.9 | ---- | 9 | 16,448 | −72.7 | ---- | ---- | ---- | ---- | ---- | 9 | 16,095 | −61.6 | ---- | 16 | 16,169 | −63.8 | ---- |
| 80 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 6 | 17,729 | −77.7 | ---- | 6 | 17,758 | −73.0 | ---- | ---- | ---- | ---- | ---- | 6 | 17,445 | −60.7 | ---- | 11 | 17,520 | −62.5 | ---- |

[1] Data not yet received.

*Temperature and relative humidity data for this level are not available or are available only for certain days. See note entitled "Change in Summarization of Radiosonde Data," p. 6, in the January 1946 issue of the MONTHLY WEATHER REVIEW.

NOTE.—All observations scheduled between 0300 and 0500, G. C. T. except at Ciudad Victoria, Mazatlan and Merida, where they are taken near 0200, G. C. T. "Number of observations" refers to those of dynamic height only. (In a few cases temperature or humidity data may be missing for one or more standard pressure surfaces of some observations.) Relative humidity data are not published for standard pressure surfaces having a corresponding mean temperature below −20° C. Relative humidity data beginning with October 1, 1948, were computed, and expressed in these tables, on the basis of vapor pressure over water. Upper air values of relative humidity at levels with temperatures less than 0° C. have formerly been computed and expressed on the basis of the vapor-pressure over ice. All relative humidity observations are obtained by electric hygrometer and have been adjusted to compensate for the value occurring below the operating range of the humidity element. For explanation of the adjustment see article entitled "Curve Method for Obtaining Monthly Means of Relative Humidity," p. 241 MONTHLY WEATHER REVIEW, December 1944.

None of the means included in these tables are based on less than 15 observations at the surface or 5 observations at a standard pressure level.

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 2200 G. C. T., during December 1949. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Speeds in meters per second*

| Altitude (meters) m. s. l. | Abilene, Tex. (534 m.) | | | Albuquerque, N. Mex. (1,627 m.) | | | Atlanta, Ga. (299 m.) | | | Billings, Mont. (1,095 m.) | | | Bismarck, N. Dak. (505 m.) | | | Boise, Idaho (868 m.) | | | Brownsville, Tex. (7 m.) | | | Buffalo, N. Y. (220 m.) | | | Burlington, Vt. (100 m.) | | | Charleston, S. C. (16 m.) | | | Cincinnati, Ohio (273 m.) | | | El Paso, Tex. (1,198 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 29 | 212 | 2.8 | 31 | 200 | 1.5 | 24 | 99 | 0.8 | 28 | 248 | 3.7 | 28 | 308 | 1.2 | 29 | 18 | 0.7 | 28 | 148 | 2.8 | 28 | 245 | 3.7 | 29 | 202 | 2.8 | 28 | 48 | 0.9 | 28 | 218 | 2.3 | 31 | 304 | 0.9 |
| 500 | | | | | | | 24 | 66 | .8 | | | | | | | | | | 28 | 157 | 5.0 | 28 | 247 | 6.5 | 29 | 213 | 6.5 | 28 | 117 | .7 | 28 | 216 | 4.4 | | | |
| 1,000 | 29 | 211 | 4.1 | | | | 21 | 272 | 1.4 | | | | 28 | 283 | 3.3 | 29 | 16 | .5 | 22 | 155 | 4.2 | 23 | 244 | 10.2 | 27 | 246 | 7.6 | 27 | 225 | 2.3 | 26 | 238 | 7.1 | | | |
| 1,500 | 27 | 233 | 5.3 | | | | 18 | 283 | 3.3 | 28 | 247 | 10.0 | 24 | 277 | 7.3 | 28 | 254 | 2.4 | 17 | 179 | 3.4 | 15 | 265 | 10.8 | 20 | 262 | 9.9 | 26 | 247 | 3.2 | 25 | 252 | 9.7 | 31 | 273 | 1.6 |
| 2,000 | 26 | 241 | 7.7 | 31 | 225 | 2.1 | 18 | 281 | 6.0 | 28 | 270 | 11.8 | 24 | 276 | 10.0 | 28 | 270 | 5.2 | 14 | 231 | 4.0 | 13 | 273 | 12.8 | 16 | 268 | 12.6 | 22 | 268 | 5.3 | 23 | 268 | 12.1 | 31 | 249 | 4.1 |
| 2,500 | 24 | 243 | 9.7 | 31 | 264 | 4.5 | 17 | 285 | 7.9 | 28 | 278 | 12.9 | 23 | 280 | 10.8 | 25 | 268 | 8.1 | 12 | 230 | 4.9 | 11 | 278 | 16.7 | 12 | 290 | 12.5 | 22 | 277 | 7.4 | 21 | 269 | 14.3 | 29 | 257 | 7.2 |
| 3,000 | 22 | 244 | 11.6 | 31 | 273 | 7.6 | 17 | 278 | 8.9 | 25 | 276 | 14.7 | 23 | 283 | 12.1 | 22 | 266 | 10.2 | 11 | 234 | 5.1 | 10 | 281 | 18.7 | 11 | 295 | 17.5 | 19 | 274 | 7.7 | 18 | 273 | 15.6 | 29 | 257 | 7.7 |
| 4,000 | 20 | 247 | 14.6 | 28 | 274 | 11.8 | 17 | 275 | 11.9 | 22 | 275 | 16.3 | 21 | 284 | 15.6 | 18 | 262 | 12.9 | | | | | | | | | | 16 | 264 | 8.6 | 16 | 277 | 18.7 | 26 | 259 | 13.0 |
| 5,000 | 16 | 257 | 13.1 | 27 | 273 | 14.8 | 14 | 287 | 15.5 | 17 | 278 | 22.0 | 13 | 276 | 16.6 | 13 | 257 | 13.4 | | | | | | | | | | 16 | 263 | 11.3 | 14 | 283 | 22.7 | 23 | 256 | 14.4 |
| 6,000 | 14 | 257 | 17.7 | 26 | 265 | 17.5 | 14 | 284 | 17.2 | | | | 10 | 285 | 17.7 | | | | | | | | | | | | | 15 | 268 | 15.1 | 14 | 276 | 26.6 | 22 | 262 | 14.5 |
| 8,000 | | | | 22 | 264 | 19.1 | 12 | 281 | 24.4 | | | | | | | | | | | | | | | | | | | | | | 10 | 277 | 25.7 | 20 | 256 | 21.4 |
| 10,000 | | | | 14 | 274 | 17.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | 16 | 251 | 21.9 |
| 12,000 | | | | 11 | 276 | 17.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | 10 | 266 | 27.5 |

| | Ely, Nev. (1,910 m.) | | | Grand Junction, Colo. (1,475 m.) | | | Greensboro, N. C. (271 m.) | | | Havre, Mont. (767 m.) | | | Jacksonville, Fla. (16 m.) | | | Joliet, Ill. (178 m.) | | | Las Vegas, Nev. (663 m.) | | | Little Rock, Ark. (88 m.) | | | Medford, Oreg. (416 m.) | | | Miami, Fla. (12 m.) | | | Mobile, Ala. (66 m.) | | | Nashville, Tenn. (182 m.) | | | New York, N. Y. (15 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 30 | 210 | 1.5 | 31 | 284 | 1.2 | 27 | 310 | 0.6 | 28 | 264 | 1.4 | 27 | 59 | 3.4 | 24 | 206 | 3.2 | 31 | 349 | 0.7 | 27 | 146 | 0.8 | 27 | 349 | 1.8 | 31 | 69 | 5.4 | 27 | 72 | 2.5 | 30 | 197 | 0.7 | 28 | 307 | 3.3 |
| 500 | | | | | | | 27 | 247 | 1.5 | | | | 27 | 77 | 3.6 | 24 | 218 | 6.3 | | | | 27 | 179 | 1.7 | 26 | 323 | 1.2 | 31 | 73 | 8.0 | 26 | 108 | 3.0 | 30 | 200 | 2.6 | 28 | 273 | 4.7 |
| 1,000 | | | | | | | 26 | 252 | 2.9 | 28 | 254 | 4.6 | 24 | 129 | 1.7 | 20 | 246 | 10.0 | 31 | 337 | .7 | 24 | 216 | 2.7 | 26 | 257 | 1.2 | 31 | 73 | 6.9 | 21 | 132 | 2.7 | 25 | 202 | 4.1 | 23 | 287 | 6.8 |
| 1,500 | | | | 31 | 282 | 1.3 | 23 | 278 | 5.6 | 26 | 265 | 9.3 | 24 | 197 | .9 | 19 | 263 | 11.5 | 31 | 298 | 1.6 | 20 | 225 | 4.7 | 24 | 235 | 4.0 | 27 | 80 | 5.6 | 20 | 164 | 1.3 | 24 | 238 | 6.9 | 21 | 291 | 9.4 |
| 2,000 | 30 | 208 | 1.4 | 31 | 212 | 1.6 | 20 | 290 | 8.0 | 24 | 275 | 12.2 | 21 | 287 | 1.8 | 18 | 265 | 12.7 | 31 | 263 | 3.0 | 19 | 243 | 6.0 | 22 | 270 | 5.5 | 23 | 80 | 5.6 | 18 | 272 | 2.0 | 24 | 252 | 9.0 | 19 | 297 | 13.0 |
| 2,500 | 29 | 236 | 2.4 | 29 | 221 | 3.5 | 18 | 288 | 12.1 | 22 | 283 | 13.7 | 19 | 291 | 2.9 | 16 | 273 | 14.4 | 30 | 265 | 3.0 | 18 | 250 | 9.8 | 16 | 280 | 6.8 | 19 | 74 | 3.3 | 17 | 251 | 2.9 | 23 | 265 | 10.7 | 18 | 292 | 14.4 |
| 3,000 | 28 | 268 | 4.0 | 28 | 236 | 6.5 | 17 | 285 | 14.3 | 12 | 287 | 15.3 | 19 | 291 | 3.7 | 14 | 279 | 16.8 | 29 | 274 | 4.4 | 18 | 261 | 11.1 | 11 | 287 | 8.3 | 17 | 76 | 2.0 | 15 | 266 | 4.9 | 21 | 267 | 12.3 | 13 | 301 | 15.7 |
| 4,000 | 25 | 286 | 9.2 | 24 | 274 | 9.5 | 15 | 283 | 17.1 | | | | 19 | 269 | 7.3 | 12 | 276 | 22.3 | 24 | 290 | 6.6 | 14 | 277 | 14.0 | | | | 13 | 290 | 2.0 | 13 | 273 | 7.4 | 19 | 270 | 15.9 | | | |
| 5,000 | 22 | 279 | 10.5 | 22 | 281 | 10.9 | 14 | 287 | 19.1 | | | | 17 | 276 | 9.4 | 12 | 278 | 26.5 | 22 | 306 | 8.5 | 14 | 279 | 16.3 | | | | 12 | 288 | 5.9 | 12 | 283 | 10.7 | 17 | 276 | 20.1 | | | |
| 6,000 | 20 | 286 | 14.6 | 18 | 285 | 13.1 | 14 | 286 | 22.2 | | | | 15 | 276 | 13.7 | | | | 20 | 313 | 11.2 | 13 | 275 | 17.6 | | | | 12 | 275 | 9.5 | 10 | 281 | 11.7 | 15 | 273 | 21.8 | | | |
| 8,000 | 13 | 300 | 16.1 | 16 | 292 | 15.1 | | | | | | | 12 | 281 | 18.0 | | | | 17 | 308 | 13.0 | | | | | | | | | | | | | | | | | |
| 10,000 | | | | 12 | 296 | 20.7 | | | | | | | 11 | 278 | 24.7 | | | | 15 | 290 | 15.2 | | | | | | | | | | | | | | | | | |
| 12,000 | | | | | | | | | | | | | | | | | | | 11 | 281 | 18.4 | | | | | | | | | | | | | | | | | |

| | Oakland Calif. (8 m.) | | | Oklahoma City, Okla. (396 m.) | | | Omaha, Nebr. (306 m.) | | | Phoenix, Ariz. (338 m.) | | | Rapid City, S. Dak. (982 m.) | | | St. Cloud, Minn. (318 m.) | | | St. Louis, Mo. (181 m.) | | | San Antonio, Tex. (240 m.) | | | San Diego, Calif. (13 m.) | | | Sault Ste. Marie, Mich. (221 m.) | | | Seattle, Wash. (116 m.) | | | Spokane, Wash. (725 m.) | | | Washington, D. C. (24 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 29 | 292 | 1.6 | 25 | 197 | 3.2 | 29 | 253 | 1.7 | 31 | 164 | 0.5 | 31 | 309 | 1.9 | 26 | 275 | 1.3 | 26 | 210 | 2.6 | 26 | 72 | 1.6 | 30 | 288 | 2.7 | 26 | 222 | 1.5 | 28 | 192 | 2.7 | 28 | 199 | 3.5 | 27 | 281 | 2.4 |
| 500 | 29 | 349 | 2.1 | 25 | 199 | 3.6 | 29 | 240 | 2.9 | 31 | 148 | .3 | | | | 26 | 248 | 1.6 | 26 | 222 | 4.8 | 26 | 109 | 1.7 | 30 | 294 | .9 | 26 | 214 | 2.6 | 28 | 207 | 4.1 | | | | 27 | 262 | 3.8 |
| 1,000 | 26 | 321 | 2.3 | 24 | 216 | 5.6 | 26 | 244 | 4.5 | 31 | 139 | 1.0 | 31 | 303 | 2.1 | 22 | 264 | 3.3 | 25 | 233 | 8.6 | 25 | 167 | 2.3 | 29 | 139 | .4 | 17 | 228 | 7.0 | 23 | 223 | 5.7 | 27 | 213 | 7.4 | 27 | 264 | 6.9 |
| 1,500 | 24 | 306 | 2.9 | 23 | 234 | 8.2 | 24 | 260 | 8.1 | 31 | 164 | 1.1 | 30 | 284 | 5.0 | 20 | 274 | 6.0 | 23 | 250 | 10.7 | 17 | 221 | 2.7 | 28 | 319 | .4 | | | | 17 | 229 | 5.9 | 22 | 232 | 11.1 | 25 | 272 | 9.0 |
| 2,000 | 23 | 324 | 4.9 | 23 | 242 | 9.8 | 23 | 271 | 10.4 | 31 | 234 | 2.2 | 28 | 282 | 6.7 | 16 | 278 | 8.8 | 20 | 263 | 11.8 | 15 | 243 | 4.0 | 28 | 293 | 1.6 | | | | 16 | 249 | 6.2 | 19 | 242 | 10.0 | 19 | 289 | 10.5 |
| 2,500 | 23 | 321 | 6.3 | 23 | 252 | 11.8 | 22 | 276 | 12.4 | 29 | 244 | 3.5 | 27 | 288 | 8.5 | 16 | 278 | 10.3 | 17 | 270 | 14.1 | 13 | 245 | 6.3 | 27 | 303 | 2.9 | | | | 14 | 250 | 6.6 | 18 | 250 | 9.1 | 17 | 293 | 12.4 |
| 3,000 | 23 | 315 | 7.7 | 22 | 253 | 13.0 | 21 | 280 | 14.0 | 28 | 248 | 3.8 | 26 | 292 | 10.6 | 15 | 273 | 12.2 | 16 | 275 | 16.5 | 13 | 252 | 8.3 | 26 | 301 | 5.2 | | | | 14 | 250 | 7.7 | 18 | 262 | 9.4 | 16 | 283 | 14.4 |
| 4,000 | 22 | 317 | 11.8 | 21 | 254 | 16.8 | 20 | 281 | 18.7 | 27 | 260 | 6.3 | 24 | 285 | 14.1 | 12 | 258 | 18.3 | 16 | 273 | 20.5 | 11 | 260 | 13.1 | 25 | 303 | 7.2 | | | | | | | 16 | 269 | 12.5 | 15 | 278 | 20.0 |
| 5,000 | 21 | 322 | 14.8 | 20 | 259 | 16.5 | 17 | 279 | 21.0 | 25 | 259 | 10.4 | 20 | 281 | 16.9 | 10 | 284 | 21.6 | 15 | 275 | 24.0 | 10 | 266 | 17.5 | 24 | 307 | 9.4 | | | | | | | 13 | 283 | 18.8 | 12 | 278 | 21.2 |
| 6,000 | 21 | 316 | 17.3 | 18 | 264 | 18.6 | 13 | 280 | 21.9 | 24 | 266 | 12.2 | 18 | 285 | 22.6 | | | | 12 | 270 | 27.3 | | | | 21 | 311 | 9.8 | | | | | | | | | | 12 | 277 | 25.0 |
| 8,000 | 15 | 319 | 19.7 | 11 | 264 | 26.3 | | | | 20 | 278 | 12.4 | 13 | 296 | 24.8 | | | | | | | | | | 19 | 295 | 11.0 | | | | | | | | | | | | |
| 10,000 | | | | | | | | | | 12 | 272 | 12.7 | | | | | | | | | | | | | 18 | 279 | 11.5 | | | | | | | | | | | | |
| 12,000 | | | | | | | | | | 10 | 268 | 17.2 | | | | | | | | | | | | | 16 | 261 | 14.3 | | | | | | | | | | | | |
| 14,000 | | | | | | | | | | | | | | | | | | | | | | | | | 10 | 274 | 17.6 | | | | | | | | | | | | |
| 16,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

TABLE 3.—*Free-air resultant winds based on rawin observations made near 0300 G. C. T., during December 1949. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Speeds in meters per second*

| Altitude (meters) m. s. l. | Albuquerque, N. Mex. (1,636 m.) | | | Big Spring, Tex. (774 m.) | | | Bismarck, N. Dak. (505 m.) | | | Brownsville, Tex. (7 m.) | | | Caribou, Maine (191 m.) | | | Charleston, S. C. (13 m.) | | | Columbia, Mo. (237 m.) | | | Grand Junction, Colo. (1,473 m.) | | | Greensboro, N. C. (275 m.) | | | Hatteras, N. C. (3 m.) | | | International Falls, Minn. (358 m.) | | | Little Rock, Ark. (80 m.) | | | Medford, Oreg. (401 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 31 | 128 | 0.9 | 31 | 156 | 3.3 | 31 | 348 | 1.3 | 31 | 90 | 0.8 | 31 | 266 | 2.5 | 31 | 36 | 1.1 | 31 | 183 | 2.2 | 31 | 176 | 0.5 | 31 | 49 | 0.3 | 31 | 330 | 1.4 | 31 | 247 | 1.9 | 31 | 198 | 0.6 | 31 | 229 | 0.3 |
| 500 | | | | | | | | | | 31 | 134 | 4.5 | 31 | 252 | 6.1 | 31 | 110 | 1.8 | 31 | 213 | 6.1 | | | | 30 | 232 | 1.0 | 31 | 346 | 1.4 | 31 | 247 | 2.8 | 31 | 185 | 3.1 | 31 | 240 | .5 |
| 1,000 | | | | 31 | 181 | 5.8 | 31 | 280 | 4.1 | 31 | 143 | 4.0 | 31 | 264 | 9.3 | 31 | 185 | 2.1 | 30 | 244 | 9.1 | | | | 30 | 252 | 4.4 | 30 | 248 | 1.6 | 31 | 271 | 4.7 | 31 | 212 | 5.2 | 31 | 208 | 1.5 |
| 1,500 | | | | 31 | 219 | 6.4 | 29 | 273 | 6.2 | 30 | 172 | 3.4 | 30 | 263 | 10.9 | 31 | 227 | 2.9 | 30 | 255 | 11.7 | 31 | 177 | .5 | 31 | 259 | 6.5 | 30 | 256 | 4.2 | 31 | 268 | 6.3 | 31 | 222 | 6.3 | 31 | 226 | 3.2 |
| 2,000 | 31 | 266 | 3.4 | 31 | 236 | 6.8 | 29 | 278 | 8.0 | 30 | 191 | 3.8 | 30 | 257 | 12.5 | 31 | 238 | 3.8 | 30 | 264 | 13.5 | 31 | 202 | 2.1 | 31 | 261 | 9.0 | 29 | 271 | 6.6 | 31 | 272 | 7.7 | 30 | 241 | 7.5 | 30 | 263 | 5.2 |
| 2,500 | 31 | 271 | 5.4 | 31 | 242 | 8.5 | 29 | 281 | 10.0 | 30 | 204 | 4.4 | 28 | 259 | 13.7 | 31 | 253 | 5.6 | 30 | 263 | 14.5 | 31 | 217 | 3.9 | 31 | 262 | 11.1 | 28 | 271 | 7.6 | 31 | 276 | 9.1 | 30 | 242 | 9.8 | 29 | 277 | 7.5 |
| 3,000 | 31 | 268 | 6.7 | 31 | 247 | 9.4 | 29 | 287 | 11.2 | 30 | 214 | 5.0 | 28 | 253 | 15.6 | 31 | 257 | 7.5 | 29 | 263 | 15.5 | 31 | 233 | 6.4 | 31 | 267 | 13.0 | 28 | 274 | 9.0 | 31 | 278 | 10.6 | 29 | 244 | 12.0 | 29 | 282 | 9.4 |
| 4,000 | 31 | 270 | 9.5 | 31 | 252 | 12.2 | 29 | 286 | 15.1 | 30 | 239 | 7.1 | 25 | 260 | 19.8 | 29 | 266 | 10.4 | 28 | 267 | 19.3 | 31 | 256 | 8.9 | 30 | 265 | 14.8 | 26 | 274 | 13.2 | 30 | 275 | 13.6 | 27 | 252 | 13.8 | 29 | 287 | 11.7 |
| 5,000 | 30 | 264 | 11.5 | 31 | 253 | 14.8 | 29 | 280 | 17.5 | 30 | 240 | 8.8 | 23 | 268 | 19.7 | 27 | 267 | 12.1 | 26 | 259 | 21.5 | 29 | 266 | 10.8 | 28 | 264 | 17.0 | 24 | 274 | 16.4 | 28 | 271 | 16.0 | 26 | 245 | 15.7 | 29 | 290 | 14.6 |
| 6,000 | 27 | 268 | 13.5 | 28 | 253 | 15.4 | 28 | 280 | 19.4 | 30 | 242 | 13.4 | 20 | 269 | 18.1 | 24 | 266 | 14.2 | 25 | 266 | 24.0 | 28 | 275 | 13.1 | 25 | 271 | 20.1 | 21 | 279 | 18.4 | 26 | 271 | 17.0 | 25 | 256 | 17.8 | 26 | 288 | 15.8 |
| 8,000 | 17 | 282 | 14.1 | 24 | 252 | 21.1 | 21 | 273 | 21.8 | 27 | 249 | 20.0 | 18 | 271 | 21.0 | 18 | 276 | 18.5 | 18 | 261 | 26.1 | 21 | 276 | 15.2 | 23 | 261 | 23.4 | 19 | 283 | 20.4 | 23 | 289 | 19.2 | 23 | 248 | 24.1 | 18 | 275 | 16.9 |
| 10,000 | 11 | 278 | 15.2 | 17 | 258 | 26.5 | 13 | 259 | 19.5 | 24 | 248 | 24.2 | 15 | 262 | 24.6 | 13 | 278 | 26.0 | 11 | 260 | 30.9 | 13 | 293 | 16.8 | 16 | 275 | 27.6 | 14 | 295 | 26.5 | 19 | 262 | 19.5 | 18 | 254 | 27.9 | 10 | 296 | 12.3 |
| 12,000 | | | | 14 | 252 | 30.6 | | | | 16 | 257 | 25.9 | | | | | | | | | | | | | 15 | 284 | 33.5 | | | | 15 | 260 | 24.6 | 12 | 260 | 36.7 | | | |
| 14,000 | | | | 10 | 263 | 26.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Altitude (meters) m. s. l. | Miami, Fla. (12 m.) | | | Nantucket, Mass. (14 m.) | | | Nashville, Tenn. (180 m.) | | | New Orleans, La. (6 m.) | | | Oakland, Calif. (8 m.) | | | Oklahoma, City, Okla. (392 m.) | | | Rapid City, S. Dak. (980 m.) | | | San Antonio, Tex. (242 m.) | | | San Juan, P. R. (28 m.) | | | St. Cloud, Minn. (318 m.) | | | Santa Maria, Calif. (72 m.) | | | Sault Ste. Marie, Mich. (221 m.) | | | Spokane, Wash. (726 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 31 | 50 | 3.0 | 30 | 280 | 2.0 | 31 | 182 | 1.0 | 30 | 72 | 3.4 | 31 | 21 | 0.3 | 29 | 178 | 2.4 | 31 | 289 | 2.1 | 31 | 56 | 2.6 | 31 | 68 | 1.7 | 30 | 270 | 0.8 | 31 | 73 | 1.8 | 31 | 228 | 0.4 | 31 | 191 | 3.6 |
| 500 | 31 | 71 | 7.8 | 30 | 262 | 6.4 | 31 | 197 | 4.4 | 30 | 100 | 4.0 | 31 | 340 | 1.4 | 25 | 185 | 3.5 | | | | 31 | 94 | 3.9 | 31 | 67 | 5.4 | 30 | 261 | 2.2 | 31 | 41 | 2.2 | 31 | 225 | 3.2 | | | |
| 1,000 | 31 | 77 | 8.1 | 30 | 265 | 7.9 | 30 | 216 | 7.2 | 30 | 132 | 2.6 | 31 | 340 | 1.9 | 24 | 224 | 6.2 | 28 | 261 | 1.6 | 31 | 151 | 4.4 | 31 | 71 | 5.8 | 30 | 256 | 4.4 | 31 | 29 | 1.6 | 30 | 258 | 6.3 | 31 | 210 | 6.2 |
| 1,500 | 31 | 77 | 7.4 | 30 | 266 | 9.8 | 28 | 235 | 6.5 | 30 | 168 | 2.3 | 31 | 316 | 2.8 | 25 | 243 | 7.7 | 29 | 286 | 7.2 | 31 | 189 | 5.3 | 31 | 63 | 5.4 | 26 | 266 | 6.7 | 31 | 359 | 2.2 | 30 | 265 | 8.7 | 31 | 230 | 8.1 |
| 2,000 | 31 | 88 | 6.1 | 30 | 271 | 11.8 | 27 | 260 | 8.1 | 30 | 207 | 2.9 | 31 | 305 | 3.6 | 25 | 253 | 9.2 | 29 | 291 | 9.2 | 31 | 215 | 6.4 | 31 | 60 | 4.8 | 25 | 277 | 8.3 | 30 | 342 | 4.4 | 28 | 267 | 9.9 | 31 | 243 | 8.9 |
| 2,500 | 31 | 86 | 4.3 | 29 | 271 | 13.6 | 27 | 262 | 10.4 | 29 | 225 | 4.7 | 31 | 306 | 5.4 | 24 | 252 | 9.9 | 31 | 296 | 11.1 | 31 | 233 | 8.6 | 31 | 61 | 4.1 | 24 | 283 | 10.5 | 30 | 329 | 6.1 | 28 | 266 | 11.9 | 29 | 260 | 9.3 |
| 3,000 | 31 | 62 | 2.9 | 29 | 273 | 14.7 | 27 | 259 | 13.2 | 27 | 230 | 6.1 | 31 | 309 | 7.6 | 23 | 264 | 11.5 | 30 | 292 | 11.9 | 31 | 241 | 10.5 | 31 | 55 | 2.8 | 24 | 282 | 12.7 | 30 | 320 | 6.8 | 28 | 268 | 13.7 | 27 | 271 | 9.4 |
| 4,000 | 30 | 242 | 1.5 | 26 | 275 | 17.7 | 26 | 261 | 18.1 | 27 | 241 | 10.1 | 30 | 300 | 8.9 | 24 | 257 | 14.5 | 30 | 285 | 14.0 | 31 | 245 | 13.3 | 30 | 3 | 3.1 | 23 | 282 | 15.2 | 30 | 319 | 8.5 | 28 | 268 | 17.3 | 25 | 282 | 11.4 |
| 5,000 | 29 | 303 | 4.9 | 24 | 274 | 21.2 | 25 | 267 | 20.9 | 27 | 248 | 12.5 | 29 | 305 | 10.0 | 24 | 256 | 16.2 | 28 | 279 | 15.5 | 30 | 247 | 15.8 | 30 | 325 | 4.2 | 22 | 284 | 16.7 | 29 | 310 | 9.8 | 22 | 277 | 18.0 | 24 | 288 | 15.0 |
| 6,000 | 29 | 298 | 7.2 | 21 | 272 | 22.0 | 23 | 266 | 22.1 | 27 | 249 | 15.4 | 28 | 302 | 11.8 | 24 | 254 | 19.1 | 26 | 274 | 17.6 | 28 | 251 | 19.2 | 30 | 315 | 5.1 | 22 | 282 | 20.1 | 27 | 300 | 11.2 | 19 | 277 | 20.7 | 23 | 291 | 16.5 |
| 8,000 | 25 | 291 | 13.5 | 14 | 263 | 24.8 | 17 | 266 | 30.0 | 23 | 251 | 22.0 | 24 | 288 | 12.5 | 18 | 259 | 24.7 | 24 | 264 | 18.5 | 23 | 251 | 26.5 | 28 | 304 | 12.0 | 19 | 274 | 22.8 | 24 | 294 | 13.0 | 10 | 279 | 23.5 | 16 | 285 | 20.8 |
| 10,000 | 24 | 281 | 17.0 | | | | | | | 22 | 261 | 31.1 | 14 | 319 | 15.9 | 14 | 271 | 26.8 | 24 | 263 | 22.3 | 12 | 268 | 34.4 | 27 | 286 | 20.0 | 13 | 266 | 25.1 | 18 | 277 | 14.6 | | | | 11 | 306 | 16.5 |
| 12,000 | 24 | 271 | 22.0 | | | | | | | 17 | 261 | 36.0 | | | | 10 | 269 | 28.3 | 17 | 264 | 22.6 | | | | 25 | 274 | 22.6 | | | | 14 | 269 | 16.6 | | | | | | |
| 14,000 | 20 | 270 | 24.3 | | | | | | | 10 | 244 | 26.3 | | | | | | | 10 | 258 | 15.5 | | | | 24 | 269 | 19.8 | | | | | | | | | | | | |
| 16,000 | 15 | 257 | 14.3 | | | | | | | | | | | | | | | | | | | | | | 20 | 299 | 12.1 | | | | | | | | | | | | |

| Altitude (meters) m. s. l. | Tatoosh Island, Wash. (33 m.) | | |
|---|---|---|---|
| | Observations | Direction | Speed |
| Surface | 28 | 207 | 0.5 |
| 500 | 26 | 200 | 2.2 |
| 1,000 | 26 | 263 | 4.4 |
| 1,500 | 26 | 265 | 6.3 |
| 2,000 | 27 | 273 | 7.7 |
| 2,500 | 26 | 279 | 9.0 |
| 3,000 | 26 | 274 | 9.5 |
| 4,000 | 24 | 276 | 11.5 |
| 5,000 | 22 | 294 | 11.7 |
| 6,000 | 20 | 287 | 13.0 |
| 8,000 | 17 | 297 | 16.4 |
| 10,000 | 12 | 289 | 18.7 |

NOTE.—Resultants prepared from rawins at high altitudes are biased toward lower wind speeds. Values appearing in this table should therefore be used with caution when the number of observations missing is greater than three. See note following Table III in the June 1948 issue of the MONTHLY WEATHER REVIEW.

# AEROLOGICAL OBSERVATIONS FOR THE YEAR 1949

TABLE 1A.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during the year 1949*

STATIONS AND MEAN SURFACE PRESSURES

| Standard pressure surface (mb.) | Albany, N. Y. (1,006.8 mb.) | | | | Albuquerque, N. Mex (837.5 mb.) | | | | Atlanta, Ga. (984.2 mb.) | | | | Big Springs, Tex. (927.3 mb.) | | | | Bismarck, N. Dak. (954.8 mb.) | | | | Boise, Idaho (915.3 mb.) | | | | Brownsville, Tex. (1,013.9 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 362 | 86 | 8.6 | 77 | 365 | 1,620 | 14.3 | 41 | 365 | 300 | 16.1 | 74 | 365 | 774 | 16.1 | 56 | 364 | 505 | 5.1 | 67 | 365 | 868 | 11.6 | 53 | 363 | 6 | 22.3 | 84 |
| 1,000 | 362 | 141 | (*) | ---- | 365 | 88 | (*) | ---- | 365 | 163 | (*) | ---- | 365 | 120 | (*) | ---- | 364 | 121 | (*) | ---- | 365 | 117 | (*) | ---- | 363 | 126 | 22.3 | 82 |
| 950 | 362 | 570 | 8.3 | 65 | 365 | 540 | (*) | ---- | 365 | 603 | 16.6 | 65 | 365 | 568 | (*) | ---- | 364 | 548 | (*) | ---- | 365 | 557 | (*) | ---- | 363 | 576 | 20.3 | 77 |
| 900 | 362 | 1,012 | 6.0 | 66 | 365 | 1,008 | (*) | ---- | 365 | 1,061 | 14.5 | 63 | 365 | 1,029 | 17.6 | 52 | 364 | 988 | 5.6 | 57 | 365 | 1,008 | 12.8 | 44 | 363 | 1,038 | 18.8 | 64 |
| 850 | 362 | 1,479 | 3.8 | 65 | 365 | 1,494 | (*) | ---- | 365 | 1,542 | 12.1 | 62 | 365 | 1,515 | 15.3 | 50 | 364 | 1,454 | 4.1 | 55 | 365 | 1,486 | 10.3 | 41 | 361 | 1,528 | 16.7 | 57 |
| 800 | 362 | 1,970 | 1.7 | 60 | 365 | 2,006 | 13.1 | 38 | 365 | 2,049 | 9.7 | 57 | 365 | 2,027 | 12.4 | 49 | 364 | 1,946 | 2.0 | 54 | 365 | 1,988 | 7.0 | 43 | 361 | 2,043 | 14.5 | 50 |
| 750 | 362 | 2,493 | −.5 | 55 | 365 | 2,550 | 9.2 | 40 | 365 | 2,586 | 7.1 | 53 | 363 | 2,570 | 9.3 | 47 | 364 | 2,471 | −.5 | 53 | 365 | 2,518 | 3.2 | 45 | 361 | 2,590 | 11.8 | 44 |
| 700 | 361 | 3,037 | −3.0 | 52 | 365 | 3,112 | 4.9 | 44 | 365 | 3,147 | 4.2 | 50 | 363 | 3,134 | 5.7 | 45 | 364 | 3,013 | −3.5 | 51 | 365 | 3,070 | −.7 | 47 | 360 | 3,160 | 8.6 | 41 |
| 650 | 357 | 3,625 | −6.0 | 49 | 365 | 3,717 | .4 | 47 | 365 | 3,750 | .9 | 46 | 362 | 3,740 | 1.7 | 43 | 364 | 3,603 | −7.0 | 50 | 365 | 3,660 | −4.8 | 48 | 359 | 3,771 | 4.7 | 41 |
| 600 | 357 | 4,244 | −9.3 | 46 | 365 | 4,349 | −4.3 | 49 | 365 | 4,386 | −2.7 | 42 | 361 | 4,377 | −2.6 | ---- | 364 | 4,216 | −10.7 | 48 | 364 | 4,282 | −9.0 | 46 | 359 | 4,416 | .6 | 42 |
| 550 | 356 | 4,914 | −13.2 | 45 | 364 | 5,031 | −9.2 | 54 | 363 | 5,070 | −6.9 | ---- | 357 | 5,062 | −7.1 | ---- | 363 | 4,883 | −14.9 | 46 | 363 | 4,952 | −13.5 | 45 | 356 | 5,109 | −3.8 | 39 |
| 500 | 353 | 5,631 | −17.7 | 45 | 364 | 5,758 | −14.3 | 50 | 362 | 5,808 | −11.5 | ---- | 355 | 5,799 | −11.9 | ---- | 360 | 5,594 | −19.6 | 44 | 362 | 5,667 | −18.5 | 45 | 354 | 5,856 | −8.6 | ---- |
| 450 | 352 | 6,419 | −22.9 | 44 | 361 | 6,556 | −19.6 | ---- | 359 | 6,614 | −16.8 | ---- | 355 | 6,604 | −17.2 | ---- | 358 | 6,376 | −25.1 | 43 | 361 | 6,450 | −23.9 | 43 | 350 | 6,671 | −14.0 | ---- |
| 400 | 350 | 7,265 | −29.0 | ---- | 358 | 7,414 | −25.6 | ---- | 359 | 7,482 | −22.9 | ---- | 354 | 7,471 | −23.5 | ---- | 354 | 7,214 | −31.2 | 42 | 358 | 7,294 | −30.0 | 40 | 350 | 7,548 | −20.2 | ---- |
| 350 | 346 | 8,207 | −35.6 | ---- | 355 | 8,369 | −32.6 | ---- | 359 | 8,446 | −30.0 | ---- | 353 | 8,434 | −30.4 | ---- | 350 | 8,139 | −38.2 | ---- | 351 | 8,231 | −36.9 | ---- | 348 | 8,523 | −27.2 | ---- |
| 300 | 342 | 9,289 | −43.0 | ---- | 351 | 9,353 | −40.3 | ---- | 357 | 9,525 | −38.1 | ---- | 345 | 9,511 | −38.4 | ---- | 344 | 9,190 | −45.4 | ---- | 344 | 9,280 | −44.4 | ---- | 340 | 9,615 | −35.5 | ---- |
| 250 | 331 | 10,470 | −50.2 | ---- | 338 | 10,656 | −48.3 | ---- | 351 | 10,754 | −47.5 | ---- | 339 | 10,741 | −47.1 | ---- | 325 | 10,388 | −51.9 | ---- | 332 | 10,485 | −51.6 | ---- | 325 | 10,858 | −44.9 | ---- |
| 200 | 308 | 11,906 | −55.7 | ---- | 321 | 12,097 | −55.5 | ---- | 342 | 12,196 | −57.0 | ---- | 322 | 12,192 | −55.3 | ---- | 289 | 11,822 | −55.3 | ---- | 309 | 11,915 | −55.4 | ---- | 304 | 12,314 | −55.2 | ---- |
| 175 | 291 | 12,750 | −57.0 | ---- | 286 | 12,944 | −58.0 | ---- | 326 | 13,035 | −60.8 | ---- | 305 | 13,037 | −58.6 | ---- | 252 | 12,674 | −55.4 | ---- | 278 | 12,764 | −55.6 | ---- | 286 | 13,158 | −60.2 | ---- |
| 150 | 259 | 13,716 | −58.1 | ---- | 243 | 13,908 | −60.1 | ---- | 299 | 13,987 | −63.6 | ---- | 288 | 14,002 | −61.9 | ---- | 223 | 13,658 | −55.6 | ---- | 239 | 13,741 | −56.2 | ---- | 247 | 14,111 | −64.6 | ---- |
| 125 | 217 | 14,855 | −58.9 | ---- | 175 | 15,032 | −62.8 | ---- | 244 | 15,101 | −66.3 | ---- | 235 | 15,121 | −65.4 | ---- | 170 | 14,843 | −56.6 | ---- | 180 | 14,898 | −57.6 | ---- | 190 | 15,218 | −68.7 | ---- |
| 100 | 141 | 16,250 | −60.1 | ---- | 86 | 16,384 | −64.2 | ---- | 179 | 16,447 | −68.4 | ---- | 150 | 16,450 | −67.0 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 102 | 16,532 | −72.6 | ---- |

| | Buffalo, N. Y. (991.4 mb.) | | | | Caribou, Maine (992.0 mb.) | | | | Charleston, S. C.[1] (1,017.0 mb.) | | | | Cuidad Victoria, Mex. (974.0 mb.) | | | | Columbia, Mo. (988.4 mb.) | | | | Dodge City, Kans. (924.7 mb.) | | | | El Paso, Tex. (880.2 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 364 | 221 | 9.0 | 74 | 365 | 191 | 3.1 | 80 | 365 | 18 | 16.8 | 86 | 343 | 335 | 25.6 | 55 | 363 | 239 | 12.2 | 73 | 365 | 792 | 11.3 | 69 | 363 | 1,195 | 18.1 | 40 |
| 1,000 | 364 | 141 | (*) | ---- | 365 | 124 | (*) | ---- | 365 | 158 | 18.5 | 78 | 343 | 100 | (*) | ---- | 363 | 139 | (*) | ---- | 365 | 128 | (*) | ---- | 363 | 91 | (*) | ---- |
| 950 | 364 | 572 | 8.9 | 64 | 365 | 546 | 4.0 | 68 | 365 | 601 | 17.2 | 68 | 343 | 555 | 24.0 | 56 | 363 | 574 | 12.7 | 62 | 365 | 565 | (*) | ---- | 363 | 547 | (*) | ---- |
| 900 | 364 | 1,014 | 6.5 | 64 | 365 | 982 | 2.3 | 66 | 365 | 1,059 | 14.8 | 65 | 343 | 1,024 | 20.5 | 60 | 363 | 1,024 | 10.7 | 61 | 365 | 1,019 | 12.9 | 59 | 363 | 1,017 | (*) | ---- |
| 850 | 363 | 1,481 | 4.1 | 63 | 365 | 1,442 | .2 | 64 | 365 | 1,541 | 12.4 | 61 | 343 | 1,516 | 17.0 | 65 | 363 | 1,499 | 8.7 | 57 | 364 | 1,498 | 11.7 | 54 | 363 | 1,502 | 17.8 | 37 |
| 800 | 363 | 1,972 | 1.8 | 60 | 365 | 1,926 | −1.9 | 61 | 365 | 2,048 | 10.0 | 56 | 343 | 2,031 | 13.9 | 68 | 363 | 1,999 | 6.5 | 54 | 364 | 2,004 | 9.6 | 51 | 363 | 2,017 | 14.2 | 39 |
| 750 | 362 | 2,496 | −.5 | 54 | 365 | 2,442 | −4.2 | 59 | 365 | 2,588 | 7.5 | 51 | 343 | 2,578 | 11.0 | 63 | 363 | 2,532 | 4.1 | 50 | 364 | 2,541 | 6.7 | 48 | 363 | 2,562 | 10.2 | 41 |
| 700 | 362 | 3,040 | −3.1 | 52 | 365 | 2,979 | −6.5 | 54 | 364 | 3,149 | 4.6 | 46 | 343 | 3,146 | 8.1 | 54 | 363 | 3,085 | 1.4 | 46 | 364 | 3,100 | 3.2 | 45 | 363 | 3,128 | 6.0 | 43 |
| 650 | 359 | 3,628 | −6.0 | 48 | 362 | 3,559 | −9.3 | 50 | 363 | 3,753 | 1.3 | ---- | 336 | 3,758 | 4.5 | 48 | 363 | 3,684 | −1.8 | 44 | 363 | 3,701 | −.5 | 42 | 363 | 3,732 | 1.6 | 47 |
| 600 | 358 | 4,246 | −9.3 | 45 | 360 | 4,171 | −12.5 | 48 | 362 | 4,390 | −2.4 | ---- | 330 | 4,404 | .6 | 47 | 363 | 4,311 | −5.5 | 42 | 362 | 4,332 | −4.8 | 41 | 362 | 4,370 | −3.1 | ---- |
| 550 | 351 | 4,916 | −13.1 | 42 | 357 | 4,832 | −16.3 | 45 | 356 | 5,077 | −6.5 | ---- | 322 | 5,097 | −3.8 | 44 | 362 | 4,991 | −9.6 | 40 | 361 | 5,012 | −9.4 | ---- | 357 | 5,054 | −7.8 | ---- |
| 500 | 343 | 5,634 | −17.6 | 41 | 357 | 5,542 | −20.7 | 44 | 355 | 5,815 | −11.1 | ---- | 310 | 5,843 | −8.4 | ---- | 362 | 5,718 | −14.3 | 36 | 359 | 5,741 | −14.3 | ---- | 348 | 5,787 | −12.8 | ---- |
| 450 | 339 | 6,419 | −22.9 | 40 | 353 | 6,319 | −25.8 | 41 | 351 | 6,623 | −16.5 | ---- | 307 | 6,663 | −13.6 | ---- | 358 | 6,516 | −19.9 | ---- | 358 | 6,537 | −19.8 | ---- | 343 | 6,592 | −18.1 | ---- |
| 400 | 331 | 7,267 | −28.9 | ---- | 353 | 7,158 | −31.5 | ---- | 347 | 7,493 | −22.6 | ---- | 304 | 7,540 | −19.7 | ---- | 355 | 7,374 | −26.1 | ---- | 355 | 7,396 | −26.3 | ---- | 329 | 7,455 | −24.2 | ---- |
| 350 | 323 | 8,209 | −35.6 | ---- | 351 | 8,092 | −37.7 | ---- | 344 | 8,460 | −29.6 | ---- | 295 | 8,518 | −26.9 | ---- | 352 | 8,325 | −33.2 | ---- | 352 | 8,348 | −33.4 | ---- | 320 | 8,414 | −31.3 | ---- |
| 300 | 302 | 9,266 | −42.7 | ---- | 341 | 9,140 | −44.2 | ---- | 339 | 9,542 | −37.7 | ---- | 290 | 9,611 | −35.3 | ---- | 345 | 9,391 | −41.0 | ---- | 345 | 9,411 | −41.1 | ---- | 305 | 9,489 | −39.3 | ---- |
| 250 | 276 | 10,478 | −50.1 | ---- | 332 | 10,344 | −50.0 | ---- | 330 | 10,774 | −47.0 | ---- | 284 | 10,855 | −45.3 | ---- | 327 | 10,614 | −49.1 | ---- | 340 | 10,628 | −49.2 | ---- | 286 | 10,715 | −47.9 | ---- |
| 200 | 227 | 11,923 | −55.6 | ---- | 296 | 11,788 | −53.5 | ---- | 307 | 12,223 | −56.5 | ---- | 269 | 12,308 | −56.3 | ---- | 266 | 12,074 | −55.6 | ---- | 318 | 12,069 | −56.1 | ---- | 244 | 12,163 | −56.0 | ---- |
| 175 | 184 | 12,771 | −57.3 | ---- | 270 | 12,640 | −53.9 | ---- | 284 | 13,063 | −60.3 | ---- | 248 | 13,145 | −61.9 | ---- | 234 | 12,919 | −58.4 | ---- | 303 | 12,915 | −58.3 | ---- | 217 | 13,050 | −59.2 | ---- |
| 150 | 144 | 13,773 | −58.8 | ---- | 225 | 13,634 | −54.4 | ---- | 243 | 14,022 | −63.4 | ---- | 197 | 14,091 | −66.9 | ---- | 199 | 13,888 | −60.3 | ---- | 271 | 13,881 | −60.4 | ---- | 177 | 13,966 | −62.8 | ---- |
| 125 | ---- | ---- | ---- | ---- | 163 | 14,807 | −55.8 | ---- | 199 | 15,136 | −66.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 234 | 15,011 | −62.8 | ---- | 120 | 15,075 | −66.1 | ---- |
| 100 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 169 | 16,399 | −64.8 | ---- | ---- | ---- | ---- | ---- |

| | Ely, Nev. (808.4 mb.) | | | | Glasgow, Mont. (938.4 mb.) | | | | Grand Junction, Colo. (852.1 mb.) | | | | Great Falls, Mont. (885.8 mb.) | | | | Greensboro, N. C. (987.1 mb.) | | | | Hatteras, N. C. (1,018.5 mb.) | | | | Honolulu, T. H. (1,015.3 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 364 | 1,908 | 6.1 | 54 | 365 | 648 | 6.1 | 54 | 365 | 1,474 | 10.8 | 51 | 364 | 1,128 | 7.6 | 51 | 364 | 273 | 13.5 | 81 | 365 | 3 | 17.4 | 82 | 365 | 3 | 25.3 | 63 |
| 1,000 | 364 | 117 | (*) | ---- | 365 | 118 | (*) | ---- | 365 | 112 | (*) | ---- | 364 | 113 | (*) | ---- | 364 | 162 | (*) | ---- | 365 | 160 | 17.5 | 77 | 365 | 136 | 23.4 | 65 |
| 950 | 364 | 558 | (*) | ---- | 365 | 548 | (*) | ---- | 365 | 556 | (*) | ---- | 364 | 551 | (*) | ---- | 364 | 598 | 15.0 | 65 | 365 | 602 | 15.4 | 69 | 365 | 583 | 19.6 | 72 |
| 900 | 364 | 1,014 | (*) | ---- | 365 | 990 | 7.3 | 48 | 365 | 1,016 | (*) | ---- | 364 | 1,002 | (*) | ---- | 364 | 1,054 | 12.7 | 64 | 365 | 1,055 | 13.0 | 65 | 365 | 1,045 | 16.1 | 77 |
| 850 | 364 | 1,490 | (*) | ---- | 365 | 1,459 | 5.2 | 47 | 365 | 1,494 | (*) | ---- | 364 | 1,468 | 7.0 | 45 | 364 | 1,532 | 10.1 | 63 | 365 | 1,534 | 10.6 | 61 | 365 | 1,530 | 13.2 | 74 |
| 800 | 364 | 1,995 | (*) | ---- | 365 | 1,951 | 2.5 | 49 | 365 | 2,002 | 10.9 | 42 | 364 | 1,963 | 3.8 | 46 | 364 | 2,035 | 7.7 | 61 | 365 | 2,037 | 8.3 | 55 | 365 | 2,039 | 11.8 | 55 |
| 750 | 364 | 2,531 | 6.4 | 42 | 365 | 2,474 | −.7 | 51 | 365 | 2,540 | 7.3 | 44 | 364 | 2,489 | .4 | 50 | 363 | 2,569 | 5.2 | 56 | 364 | 2,572 | 6.0 | 50 | 365 | 2,583 | 10.5 | 35 |
| 700 | 364 | 3,089 | 2.3 | 44 | 365 | 3,018 | −4.1 | 52 | 365 | 3,101 | 3.1 | 48 | 364 | 3,034 | −3.2 | 52 | 363 | 3,126 | 2.6 | 51 | 363 | 3,130 | 3.1 | 46 | 365 | 3,150 | 8.0 | 31 |
| 650 | 364 | 3,685 | −2.1 | 45 | 365 | 3,603 | −7.6 | 51 | 365 | 3,699 | −1.3 | 51 | 363 | 3,621 | −7.2 | 51 | 360 | 3,725 | −.6 | 48 | 356 | 3,730 | −.1 | 44 | 361 | 3,760 | 4.6 | ---- |
| 600 | 364 | 4,313 | −6.7 | 47 | 364 | 4,217 | −11.6 | 50 | 365 | 4,329 | −5.9 | 53 | 363 | 4,235 | −11.4 | 50 | 358 | 4,357 | −4.2 | 45 | 353 | 4,364 | −3.8 | 43 | 360 | 4,405 | .9 | ---- |
| 550 | 364 | 4,987 | −11.7 | 48 | 362 | 4,880 | −15.9 | 47 | 365 | 5,007 | −10.3 | 52 | 363 | 4,899 | −15.9 | 49 | 357 | 5,040 | −8.2 | 40 | 350 | 5,047 | −7.8 | ---- | 359 | 5,098 | −3.3 | ---- |
| 500 | 364 | 5,711 | −16.7 | 49 | 358 | 5,591 | −20.7 | 47 | 364 | 5,731 | −15.7 | 48 | 362 | 5,608 | −20.8 | 45 | 356 | 5,772 | −12.8 | ---- | 349 | 5,781 | −12.3 | ---- | 358 | 5,846 | −8.4 | ---- |
| 450 | 364 | 6,499 | −22.1 | ---- | 363 | 6,365 | −26.3 | 41 | 363 | 6,525 | −21.1 | 43 | 361 | 6,387 | −26.7 | ---- | 355 | 6,574 | −18.1 | ---- | 345 | 6,585 | −17.7 | ---- | 357 | 6,661 | −14.1 | ---- |
| 400 | 362 | 7,349 | −28.4 | ---- | 348 | 7,201 | −32.4 | ---- | 360 | 7,377 | −27.3 | 41 | 360 | 7,219 | −32.5 | ---- | 352 | 7,438 | −24.3 | ---- | 340 | 7,451 | −23.8 | ---- | 356 | 7,539 | −20.6 | ---- |
| 350 | 360 | 8,292 | −35.5 | ---- | 341 | 8,129 | −39.2 | ---- | 356 | 8,325 | −34.3 | ---- | 359 | 8,146 | −39.3 | ---- | 347 | 8,398 | −31.2 | ---- | 332 | 8,412 | −30.8 | ---- | 354 | 8,512 | −28.0 | ---- |
| 300 | 352 | 9,348 | −43.0 | ---- | 333 | 9,171 | −46.4 | ---- | 344 | 9,383 | −42.1 | ---- | 355 | 9,187 | −46.7 | ---- | 344 | 9,473 | −39.1 | ---- | 324 | 9,488 | −38.7 | ---- | 353 | 9,600 | −36.1 | ---- |
| 250 | 345 | 10,556 | −50.6 | ---- | 316 | 10,358 | −52.9 | ---- | 328 | 10,598 | −49.5 | ---- | 341 | 10,381 | −53.1 | ---- | 334 | 10,700 | −47.8 | ---- | 312 | 10,799 | −47.7 | ---- | 347 | 10,843 | −45.1 | ---- |
| 200 | 313 | 11,989 | −55.5 | ---- | 275 | 11,781 | −55.4 | ---- | 295 | 12,042 | −55.0 | ---- | 303 | 11,803 | −56.0 | ---- | 311 | 12,146 | −56.2 | ---- | 287 | 12,162 | −56.4 | ---- | 341 | 12,299 | −55.3 | ---- |
| 175 | 294 | 12,835 | −56.8 | ---- | 250 | 12,634 | −55.0 | ---- | 263 | 12,894 | −56.6 | ---- | 274 | 12,651 | −55.5 | ---- | 288 | 12,991 | −59.2 | ---- | 252 | 13,001 | −59.5 | ---- | 337 | 13,141 | −60.2 | ---- |
| 150 | 264 | 13,806 | −58.4 | ---- | 200 | 13,618 | −55.0 | ---- | 231 | 13,867 | −58.1 | ---- | 236 | 13,629 | −55.3 | ---- | 234 | 13,955 | −61.6 | ---- | 208 | 13,971 | −62.2 | ---- | 327 | 14,093 | −64.4 | ---- |
| 125 | 204 | 14,948 | −60.5 | ---- | 147 | 14,782 | −58.0 | ---- | 170 | 15,009 | −60.0 | ---- | 196 | 14,784 | −56.4 | ---- | ---- | ---- | ---- | ---- | 139 | 15,094 | −64.7 | ---- | 312 | 15,197 | −68.0 | ---- |
| 100 | 139 | 16,334 | −62.1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 127 | 16,239 | −57.0 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 279 | 16,327 | −70.9 | ---- |
| 80 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 234 | 17,850 | −69.8 | ---- |

See footnotes at end of table, p. 349.

TABLE 1A.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during the year 1949*—Continued

| Standard pressure surface (mb.) | International Falls, Minn. (971.5 mb.) | | | | Joliet, Ill. (995.5 mb.) | | | | Lake Charles, La. (1,016.3 mb.) | | | | Lander, Wyo. (828.0 mb.) | | | | Las Vegas, Nev. (936.1 mb.) | | | | Little Rock, Ark. (1,007.9 mb.) | | | | Mazatlan, Mex. (1,009.3 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 364 | 360 | 2.2 | 77 | 363 | 178 | 9.1 | 77 | 364 | 5 | 19.1 | 85 | 365 | 1,696 | 6.2 | 53 | 364 | 660 | 18.6 | 31 | 364 | 79 | 16.0 | 77 | 353 | 14 | 25.0 | 75 |
| 1,000 | 364 | 123 | (*) | ---- | 363 | 139 | (*) | ---- | 364 | 144 | 19.9 | 77 | 365 | 114 | (*) | ---- | 364 | 84 | (*) | ---- | 364 | 145 | 16.0 | 65 | 353 | 95 | 24.4 | 73 |
| 950 | 364 | 543 | 3.6 | 69 | 363 | 570 | 9.9 | 64 | 364 | 589 | 18.2 | 71 | 365 | 554 | (*) | ---- | 364 | 532 | (*) | ---- | 364 | 586 | 16.3 | 64 | 353 | 553 | 23.6 | 55 |
| 900 | 364 | 979 | 2.0 | 66 | 363 | 1,015 | 8.0 | 61 | 364 | 1,048 | 16.2 | 67 | 365 | 1,007 | (*) | ---- | 364 | 998 | 19.8 | 27 | 364 | 1,042 | 14.0 | 64 | 353 | 1,017 | 21.8 | 50 |
| 850 | 364 | 1,439 | .5 | 64 | 363 | 1,485 | 5.9 | 58 | 364 | 1,534 | 14.0 | 60 | 365 | 1,479 | (*) | ---- | 364 | 1,486 | 16.0 | 29 | 364 | 1,523 | 12.0 | 59 | 353 | 1,511 | 18.9 | 50 |
| 800 | 364 | 1,924 | −1.3 | 60 | 363 | 1,980 | 3.8 | 54 | 364 | 2,043 | 11.7 | 53 | 365 | 1,981 | 8.1 | 43 | 364 | 1,997 | 11.9 | 32 | 364 | 2,029 | 9.8 | 54 | 352 | 2,029 | 15.8 | 48 |
| 750 | 364 | 2,443 | −3.5 | 56 | 361 | 2,509 | 1.6 | 49 | 363 | 2,588 | 9.2 | 48 | 365 | 2,516 | 4.9 | 42 | 363 | 2,536 | 7.7 | 35 | 364 | 2,568 | 7.3 | 51 | 352 | 2,582 | 12.5 | 46 |
| 700 | 364 | 2,980 | −6.0 | 53 | 361 | 3,057 | −1.1 | 45 | 361 | 3,151 | 6.1 | 44 | 365 | 3,069 | 1.0 | 44 | 363 | 3,097 | 3.4 | 36 | 364 | 3,128 | 4.2 | 48 | 352 | 3,149 | 8.7 | 47 |
| 650 | 364 | 3,564 | −9.0 | 50 | 361 | 3,650 | −4.3 | 42 | 358 | 3,757 | 2.5 | 45 | 365 | 3,666 | −3.1 | 47 | 363 | 3,697 | −1.0 | 36 | 363 | 3,731 | .8 | ---- | 346 | 3,763 | 4.8 | ---- |
| 600 | 363 | 4,173 | −12.5 | 48 | 361 | 4,271 | −8.0 | 39 | 358 | 4,397 | −1.5 | ---- | 365 | 4,200 | −7.6 | 48 | 359 | 4,327 | −5.4 | 36 | 358 | 4,367 | −3.0 | ---- | 342 | 4,407 | .6 | ---- |
| 550 | 359 | 4,836 | −16.4 | 46 | 361 | 4,944 | −12.0 | 36 | 354 | 5,086 | −5.7 | ---- | 364 | 4,963 | −12.3 | 47 | 358 | 5,005 | −9.9 | ---- | 355 | 5,051 | −7.2 | ---- | 338 | 5,102 | −3.7 | ---- |
| 500 | 357 | 5,543 | −20.9 | 42 | 360 | 5,665 | −16.6 | ---- | 351 | 5,825 | −10.6 | ---- | 364 | 5,683 | −17.5 | 44 | 357 | 5,732 | −15.0 | ---- | 353 | 5,787 | −11.9 | ---- | 335 | 5,848 | −8.4 | ---- |
| 450 | 356 | 6,320 | −26.2 | 41 | 359 | 6,455 | −22.0 | ---- | 348 | 6,636 | −16.0 | ---- | 364 | 6,471 | −23.2 | 42 | 356 | 6,527 | −20.8 | ---- | 350 | 6,592 | −17.4 | ---- | 326 | 6,668 | −13.5 | ---- |
| 400 | 351 | 7,156 | −32.0 | ---- | 359 | 7,305 | −28.1 | ---- | 345 | 7,506 | −22.2 | ---- | 364 | 7,315 | −29.6 | 40 | 355 | 7,381 | −27.3 | ---- | 349 | 7,458 | −23.6 | ---- | 322 | 7,545 | −19.5 | ---- |
| 350 | 348 | 8,083 | −38.5 | ---- | 356 | 8,250 | −35.0 | ---- | 340 | 8,472 | −29.4 | ---- | 362 | 8,228 | −36.8 | ---- | 354 | 8,329 | −34.4 | ---- | 341 | 8,421 | −30.6 | ---- | 313 | 8,523 | −26.7 | ---- |
| 300 | 341 | 9,127 | −45.5 | ---- | 354 | 9,309 | −42.4 | ---- | 337 | 9,553 | −37.7 | ---- | 360 | 9,301 | −44.7 | ---- | 350 | 9,389 | −42.0 | ---- | 337 | 9,497 | −38.6 | ---- | 309 | 9,617 | −35.0 | ---- |
| 250 | 326 | 10,325 | −51.4 | ---- | 351 | 10,520 | −50.0 | ---- | 333 | 10,784 | −47.2 | ---- | 349 | 10,501 | −52.1 | ---- | 343 | 10,601 | −49.6 | ---- | 328 | 10,727 | −47.4 | ---- | 296 | 10,864 | −44.7 | ---- |
| 200 | 289 | 11,763 | −54.0 | ---- | 335 | 11,959 | −55.7 | ---- | 325 | 12,227 | −57.1 | ---- | 319 | 11,928 | −56.4 | ---- | 324 | 12,039 | −55.7 | ---- | 307 | 12,176 | −55.7 | ---- | 289 | 12,322 | −55.7 | ---- |
| 175 | 261 | 12,618 | −54.1 | ---- | 322 | 12,808 | −57.4 | ---- | 315 | 13,063 | −61.4 | ---- | 290 | 12,778 | −56.8 | ---- | 309 | 12,884 | −57.4 | ---- | 292 | 13,016 | −58.6 | ---- | 279 | 13,161 | −61.0 | ---- |
| 150 | 228 | 13,602 | −54.2 | ---- | 289 | 13,775 | −59.0 | ---- | 301 | 14,009 | −64.9 | ---- | 260 | 13,755 | −57.7 | ---- | 283 | 13,853 | −59.7 | ---- | 252 | 13,974 | −61.3 | ---- | 262 | 14,111 | −65.8 | ---- |
| 125 | 164 | 14,790 | −55.2 | ---- | 253 | 14,916 | −60.7 | ---- | 254 | 15,111 | −68.5 | ---- | 204 | 14,928 | −60.0 | ---- | 246 | 14,981 | −62.4 | ---- | 193 | 15,092 | −64.1 | ---- | 215 | 15,206 | −70.4 | ---- |
| 100 | ---- | ---- | ---- | ---- | 174 | 16,312 | −61.4 | ---- | 192 | 16,440 | −71.1 | ---- | 140 | 16,318 | −60.9 | ---- | 185 | 16,353 | −63.9 | ---- | 120 | 16,476 | −66.6 | ---- | 160 | 16,517 | −73.9 | ---- |
| 80 | ---- | ---- | ---- | ---- | 113 | 17,710 | −60.0 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 97 | 17,821 | −73.5 | ---- |

| Standard pressure surface (mb.) | Medford, Oreg. (969.5 mb.) | | | | Merida, Mex. (1,011.5 mb.) | | | | Miami, Fla. (1,017.5 mb.) | | | | Nantucket, Mass. (1,016.0 mb.) | | | | Nashville, Tenn. (997.2 mb.) | | | | New Orleans, La. (1,017.3 mb.) | | | | North Platte, Nebr. (917.2 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 364 | 401 | 13.2 | 61 | 355 | 27 | 25.9 | 73 | 365 | 4 | 23.2 | 79 | 360 | 14 | 9.8 | 86 | 365 | 177 | 15.0 | 76 | 363 | 2 | 16.6 | 84 | 363 | 849 | 8.3 | 72 |
| 1,000 | 364 | 138 | (*) | ---- | 355 | 128 | 25.4 | 73 | 365 | 156 | 23.3 | 75 | 360 | 146 | 10.9 | 78 | 365 | 153 | (*) | ---- | 363 | 150 | 20.5 | 77 | 363 | 123 | (*) | ---- |
| 950 | 364 | 575 | 13.8 | 53 | 355 | 579 | 23.2 | 71 | 365 | 604 | 20.6 | 74 | 360 | 577 | 9.9 | 68 | 365 | 591 | 14.7 | 63 | 363 | 596 | 18.6 | 70 | 363 | 558 | (*) | ---- |
| 900 | 364 | 1,025 | 11.3 | 52 | 355 | 1,050 | 20.2 | 71 | 365 | 1,069 | 17.8 | 71 | 360 | 1,022 | 7.9 | 63 | 365 | 1,044 | 12.4 | 62 | 363 | 1,056 | 16.4 | 66 | 363 | 1,006 | 10.3 | 60 |
| 850 | 364 | 1,500 | 8.1 | 54 | 355 | 1,541 | 17.0 | 72 | 365 | 1,556 | 15.0 | 66 | 360 | 1,492 | 5.9 | 58 | 365 | 1,522 | 10.0 | 60 | 363 | 1,541 | 14.2 | 61 | 363 | 1,482 | 9.1 | 54 |
| 800 | 364 | 1,997 | 4.6 | 57 | 355 | 2,056 | 13.8 | 69 | 365 | 2,068 | 12.7 | 56 | 360 | 1,986 | 3.9 | 53 | 365 | 2,025 | 7.7 | 56 | 362 | 2,051 | 11.9 | 55 | 363 | 1,982 | 6.9 | 52 |
| 750 | 364 | 2,525 | 1.6 | 54 | 355 | 2,602 | 11.2 | 60 | 365 | 2,611 | 10.3 | 50 | 360 | 2,513 | 1.6 | 48 | 365 | 2,559 | 5.2 | 53 | 361 | 2,593 | 9.2 | 49 | 362 | 2,515 | 4.2 | 50 |
| 700 | 364 | 3,074 | −1.4 | 48 | 355 | 3,173 | 8.7 | 50 | 363 | 3,179 | 7.5 | ---- | 360 | 3,062 | −1.0 | 46 | 365 | 3,116 | 2.4 | 50 | 359 | 3,158 | 6.3 | 46 | 362 | 3,069 | .9 | 48 |
| 650 | 364 | 3,663 | −4.9 | 45 | 355 | 3,785 | 5.6 | ---- | 362 | 3,788 | 4.2 | ---- | 358 | 3,653 | −4.0 | 44 | 363 | 3,716 | −.9 | 48 | 355 | 3,764 | 2.7 | 46 | 362 | 3,664 | −2.9 | 47 |
| 600 | 363 | 4,285 | −8.7 | 40 | 349 | 4,432 | 1.9 | ---- | 359 | 4,432 | .5 | ---- | 355 | 4,278 | −7.5 | 42 | 361 | 4,323 | −4.5 | 45 | 350 | 4,406 | −1.0 | ---- | 360 | 4,290 | −7.0 | 46 |
| 550 | 363 | 4,955 | −13.0 | 38 | 347 | 5,129 | −2.2 | ---- | 357 | 5,126 | −3.6 | ---- | 353 | 4,951 | −11.5 | ---- | 359 | 5,028 | −8.6 | 41 | 346 | 5,095 | −5.2 | ---- | 357 | 4,966 | −11.6 | 44 |
| 500 | 363 | 5,674 | −17.7 | 37 | 345 | 5,880 | −6.9 | ---- | 356 | 5,872 | −8.2 | ---- | 349 | 5,673 | −16.2 | ---- | 357 | 5,759 | −13.2 | 39 | 340 | 5,837 | −10.0 | ---- | 354 | 5,688 | −16.4 | 41 |
| 450 | 360 | 6,459 | −23.1 | ---- | 342 | 6,699 | −12.4 | ---- | 353 | 6,691 | −13.7 | ---- | 343 | 6,466 | −21.4 | ---- | 353 | 6,560 | −18.6 | ---- | 335 | 6,650 | −15.3 | ---- | 347 | 6,478 | −22.0 | ---- |
| 400 | 357 | 7,306 | −29.9 | ---- | 340 | 7,583 | −18.8 | ---- | 349 | 7,568 | −19.9 | ---- | 341 | 7,318 | −27.3 | ---- | 350 | 7,422 | −24.6 | ---- | 335 | 7,523 | −21.5 | ---- | 344 | 7,328 | −27.9 | ---- |
| 350 | 352 | 8,246 | −36.4 | ---- | 336 | 8,562 | −26.4 | ---- | 343 | 8,544 | −27.1 | ---- | 331 | 8,265 | −33.9 | ---- | 350 | 8,380 | −31.6 | ---- | 324 | 8,492 | −28.6 | ---- | 336 | 8,273 | −35.4 | ---- |
| 300 | 342 | 9,297 | −44.1 | ---- | 336 | 9,656 | −35.0 | ---- | 339 | 9,637 | −35.9 | ---- | 328 | 9,328 | −41.4 | ---- | 344 | 9,451 | −39.5 | ---- | 317 | 9,578 | −36.8 | ---- | 328 | 9,330 | −43.1 | ---- |
| 250 | 324 | 10,498 | −51.6 | ---- | 332 | 10,900 | −45.0 | ---- | 334 | 10,878 | −45.2 | ---- | 315 | 10,546 | −49.1 | ---- | 339 | 10,678 | −48.3 | ---- | 306 | 10,815 | −46.3 | ---- | 314 | 10,541 | −50.8 | ---- |
| 200 | 301 | 11,931 | −56.5 | ---- | 326 | 12,352 | −56.5 | ---- | 309 | 12,331 | −55.9 | ---- | 277 | 11,963 | −55.7 | ---- | 317 | 12,120 | −56.4 | ---- | 287 | 12,266 | −56.2 | ---- | 295 | 11,967 | −56.6 | ---- |
| 175 | 281 | 12,782 | −57.0 | ---- | 323 | 13,187 | −62.5 | ---- | 290 | 13,169 | −60.9 | ---- | 251 | 12,827 | −57.3 | ---- | 296 | 12,961 | −59.3 | ---- | 266 | 13,106 | −60.7 | ---- | 264 | 12,834 | −58.1 | ---- |
| 150 | 209 | 13,758 | −57.5 | ---- | 305 | 14,123 | −67.9 | ---- | 249 | 14,117 | −65.4 | ---- | 219 | 13,800 | −58.5 | ---- | 249 | 13,922 | −61.9 | ---- | 239 | 14,057 | −64.3 | ---- | 233 | 13,806 | −59.7 | ---- |
| 125 | 150 | 14,928 | −58.5 | ---- | 256 | 15,198 | −73.2 | ---- | 176 | 15,222 | −69.5 | ---- | 171 | 14,928 | −60.1 | ---- | 185 | 15,037 | −64.0 | ---- | 181 | 15,164 | −67.6 | ---- | 184 | 15,213 | −61.9 | ---- |
| 100 | ---- | ---- | ---- | ---- | 151 | 16,493 | −76.4 | ---- | 100 | 16,546 | −72.4 | ---- | 102 | 16,329 | −60.6 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

See footnotes at end of table, p. 349.

TABLE 1A.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during the year 1949*—Continued

| Standard pressure surface (mb.) | Oakland, Calif. (1,015.8 mb.) | | | | Oklahoma City, Okla. (970.5 mb.) | | | | Omaha, Nebr. (979.8 mb.) | | | | Phoenix, Ariz. (972.3 mb.) | | | | Pittsburgh, Pa. (973.0 mb.) | | | | Portland, Maine (1,014.1 mb.) | | | | Rapid City, S. Dak. (902.0 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 364 | 6 | 13.1 | 74 | 364 | 391 | 14.3 | 70 | 364 | 308 | 11.1 | 69 | 364 | 339 | 21.3 | 41 | 355 | 382 | 11.2 | 70 | 365 | 20 | 6.9 | 82 | 360 | 980 | 6.3 | 62 |
| 1,000 | 364 | 137 | 13.0 | 71 | 364 | 134 | (*) | ---- | 364 | 135 | (*) | ---- | 364 | 92 | (*) | ---- | 355 | 150 | (*) | ---- | 365 | 135 | 8.0 | 55 | 360 | 118 | (*) | ---- |
| 950 | 364 | 574 | 13.1 | 59 | 364 | 573 | 15.5 | 63 | 364 | 567 | 10.5 | 60 | 364 | 543 | 24.1 | 30 | 355 | 587 | 11.4 | 65 | 365 | 563 | 7.6 | 63 | 360 | 552 | (*) | ---- |
| 900 | 364 | 1,023 | 12.8 | 45 | 363 | 1,029 | 14.0 | 60 | 364 | 1,014 | 9.0 | 60 | 364 | 1,010 | 20.7 | 30 | 355 | 1,032 | 9.1 | 64 | 365 | 1,003 | 5.4 | 62 | 360 | 999 | (*) | ---- |
| 850 | 364 | 1,501 | 10.9 | 40 | 363 | 1,510 | 12.0 | 57 | 364 | 1,487 | 7.5 | 57 | 364 | 1,500 | 16.8 | 32 | 354 | 1,504 | 6.6 | 62 | 365 | 1,469 | 3.3 | 60 | 360 | 1,471 | 8.4 | 49 |
| 800 | 364 | 2,004 | 8.2 | 37 | 363 | 2,016 | 9.6 | 52 | 364 | 1,984 | 5.6 | 53 | 364 | 2,013 | 12.7 | 36 | 354 | 2,000 | 4.1 | 59 | 365 | 1,959 | 1.1 | 56 | 360 | 1,970 | 5.9 | 50 |
| 750 | 364 | 2,539 | 5.3 | 35 | 363 | 2,554 | 7.1 | 47 | 364 | 2,516 | 3.1 | 49 | 364 | 2,556 | 8.5 | 38 | 354 | 2,529 | 1.7 | 53 | 365 | 2,482 | −1.2 | 51 | 360 | 2,501 | 2.9 | 51 |
| 700 | 364 | 3,094 | 2.0 | 34 | 363 | 3,114 | 4.0 | 44 | 364 | 3,066 | .1 | 46 | 364 | 3,116 | 4.4 | 39 | 354 | 3,076 | −.9 | 51 | 365 | 3,023 | −3.7 | 49 | 359 | 3,052 | −.4 | 51 |
| 650 | 362 | 3,692 | −1.6 | 35 | 362 | 3,715 | .2 | 42 | 364 | 3,661 | −3.5 | 43 | 362 | 3,721 | .2 | 40 | 353 | 3,672 | −4.0 | 49 | 361 | 3,616 | −6.6 | 45 | 359 | 3,645 | −4.1 | 50 |
| 600 | 359 | 4,322 | −5.6 | 34 | 362 | 4,349 | −3.8 | ---- | 364 | 4,285 | −7.3 | 42 | 362 | 4,352 | −4.1 | ---- | 352 | 4,292 | −7.4 | 45 | 360 | 4,227 | −10.1 | 43 | 357 | 4,267 | −9.0 | 49 |
| 550 | 357 | 5,000 | −10.1 | ---- | 360 | 5,033 | −8.2 | ---- | 363 | 4,956 | −11.5 | 39 | 362 | 5,034 | −8.7 | ---- | 351 | 4,968 | −11.4 | 42 | 357 | 4,897 | −13.9 | ---- | 355 | 4,940 | −12.6 | 47 |
| 500 | 355 | 5,726 | −15.2 | ---- | 359 | 5,765 | −13.1 | ---- | 361 | 5,683 | −16.2 | 37 | 361 | 5,764 | −13.7 | ---- | 349 | 5,689 | −15.8 | 38 | 351 | 5,611 | −18.6 | ---- | 355 | 5,659 | −17.6 | 44 |
| 450 | 352 | 6,521 | −20.9 | ---- | 357 | 6,567 | −18.6 | ---- | 359 | 6,475 | −21.7 | ---- | 359 | 6,565 | −19.2 | ---- | 346 | 6,484 | −21.0 | ---- | 347 | 6,395 | −23.9 | ---- | 355 | 6,446 | −23.0 | 42 |
| 400 | 351 | 7,375 | −27.5 | ---- | 351 | 7,429 | −24.9 | ---- | 358 | 7,326 | −27.9 | ---- | 357 | 7,423 | −25.6 | ---- | 343 | 7,336 | −27.1 | ---- | 344 | 7,240 | −29.8 | ---- | 352 | 7,292 | −29.3 | ---- |
| 350 | 351 | 8,321 | −34.6 | ---- | 345 | 8,386 | −31.9 | ---- | 355 | 8,271 | −34.8 | ---- | 357 | 8,377 | −32.7 | ---- | 327 | 8,287 | −33.8 | ---- | 339 | 8,330 | −36.5 | ---- | 349 | 8,233 | −36.3 | ---- |
| 300 | 344 | 9,380 | −42.4 | ---- | 334 | 9,458 | −39.9 | ---- | 352 | 9,330 | −42.5 | ---- | 352 | 9,444 | −40.5 | ---- | 310 | 9,352 | −41.3 | ---- | 326 | 9,235 | −43.6 | ---- | 341 | 9,285 | −44.0 | ---- |
| 250 | 335 | 10,589 | −50.4 | ---- | 322 | 10,679 | −48.6 | ---- | 348 | 10,541 | −50.3 | ---- | 338 | 10,665 | −48.5 | ---- | 278 | 10,577 | −49.1 | ---- | 310 | 10,443 | −50.8 | ---- | 331 | 10,491 | −51.0 | ---- |
| 200 | 322 | 12,026 | −56.2 | ---- | 294 | 12,116 | −56.0 | ---- | 320 | 11,973 | −55.9 | ---- | 316 | 12,105 | −55.5 | ---- | 231 | 12,032 | −55.7 | ---- | 279 | 11,884 | −55.9 | ---- | 302 | 11,926 | −55.5 | ---- |
| 175 | 305 | 12,870 | −57.3 | ---- | 264 | 12,962 | −58.6 | ---- | 302 | 12,822 | −57.5 | ---- | 299 | 12,950 | −58.0 | ---- | 196 | 12,877 | −57.6 | ---- | 248 | 12,729 | −57.2 | ---- | 265 | 12,773 | −55.7 | ---- |
| 150 | 268 | 13,841 | −58.7 | ---- | 231 | 13,921 | −61.3 | ---- | 266 | 13,794 | −58.8 | ---- | 276 | 13,916 | −60.8 | ---- | 153 | 13,867 | −60.0 | ---- | 211 | 13,698 | −58.3 | ---- | 230 | 13,752 | −56.5 | ---- |
| 125 | 237 | 14,982 | −60.6 | ---- | 155 | 15,048 | −64.4 | ---- | 226 | 14,933 | −60.7 | ---- | 227 | 15,034 | −63.6 | ---- | 107 | 15,021 | −62.2 | ---- | 157 | 14,847 | −59.5 | ---- | 170 | 14,927 | −58.3 | ---- |
| 100 | 182 | 16,362 | −62.0 | ---- | | | | | 163 | 16,355 | −62.3 | ---- | 162 | 16,398 | −65.4 | ---- | | | | | | | | | | | | |

| Standard pressure surface (mb.) | St. Cloud, Minn. (977.3 mb.) | | | | San Antonio, Tex. (987.8 mb.) | | | | San Juan, P. R.[1] (1,014.5 mb.) | | | | Santa Maria, Calif. (1,007.6 mb.) | | | | Sault Ste. Marie, Mich. (989.1 mb.) | | | | Spokane, Wash. (931.4 mb.) | | | | Swan Island, W. I. (1,013.2 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 365 | 317 | 5.5 | 75 | 365 | 240 | 19.1 | 73 | 363 | 19 | 24.8 | 82 | 365 | 71 | 12.2 | 80 | 364 | 221 | 4.2 | 79 | 362 | 721 | 9.3 | 57 | 360 | 10 | 26.0 | 80 |
| 1,000 | 365 | 126 | (*) | ---- | 365 | 133 | (*) | ---- | 363 | 142 | 24.3 | 80 | 365 | 135 | 12.4 | 76 | 364 | 130 | (*) | ---- | 362 | 125 | (*) | ---- | 360 | 126 | 25.3 | 80 |
| 950 | 365 | 553 | 6.5 | 65 | 365 | 580 | 19.4 | 66 | 363 | 592 | 21.1 | 81 | 365 | 572 | 13.6 | 61 | 364 | 553 | 4.7 | 69 | 362 | 557 | (*) | ---- | 360 | 579 | 22.2 | 82 |
| 900 | 365 | 992 | 5.2 | 62 | 365 | 1,041 | 17.1 | 67 | 363 | 1,057 | 17.9 | 80 | 365 | 1,022 | 14.2 | 43 | 364 | 989 | 3.2 | 67 | 362 | 1,006 | 9.5 | 51 | 360 | 1,054 | 19.4 | 78 |
| 850 | 365 | 1,457 | 3.6 | 59 | 365 | 1,527 | 14.9 | 64 | 363 | 1,545 | 15.1 | 76 | 365 | 1,503 | 12.2 | 39 | 364 | 1,451 | 1.1 | 65 | 362 | 1,477 | 6.5 | 51 | 360 | 1,536 | 16.6 | 72 |
| 800 | 365 | 1,948 | 1.7 | 54 | 365 | 2,039 | 12.6 | 56 | 363 | 2,057 | 12.7 | 67 | 365 | 2,008 | 9.5 | 36 | 364 | 1,937 | −1.0 | 61 | 362 | 1,972 | 3.1 | 52 | 360 | 2,051 | 14.0 | 64 |
| 750 | 365 | 2,472 | −.5 | 50 | 365 | 2,582 | 10.2 | 47 | 363 | 2,603 | 10.8 | 56 | 365 | 2,546 | 6.7 | 29 | 364 | 2,456 | −3.1 | 56 | 362 | 2,495 | .4 | 53 | 360 | 2,597 | 11.4 | 53 |
| 700 | 365 | 3,016 | −3.3 | 48 | 365 | 3,150 | 7.1 | 41 | 362 | 3,171 | 8.1 | ---- | 365 | 3,104 | 3.4 | 31 | 364 | 2,994 | −5.7 | 54 | 362 | 3,040 | −3.8 | 52 | 360 | 3,168 | 8.9 | ---- |
| 650 | 364 | 3,604 | −6.5 | 46 | 363 | 3,757 | 3.4 | 39 | 361 | 4,232 | 4.8 | ---- | 363 | 3,704 | −.3 | ---- | 364 | 3,577 | −8.6 | 50 | 361 | 3,625 | −7.5 | 50 | 359 | 3,781 | 5.8 | ---- |
| 600 | 360 | 4,221 | −10.0 | 44 | 358 | 4,400 | −.8 | 40 | 356 | 4,428 | 1.2 | ---- | 363 | 4,336 | −4.3 | ---- | 362 | 4,188 | −12.0 | 46 | 361 | 4,240 | −11.4 | 49 | 357 | 4,429 | 2.2 | ---- |
| 550 | 358 | 4,888 | −14.1 | 42 | 357 | 5,090 | −5.3 | 38 | 352 | 5,123 | −2.9 | ---- | 361 | 5,017 | −9.5 | ---- | 360 | 4,851 | −15.9 | 46 | 359 | 4,904 | −15.5 | 46 | 353 | 5,126 | −1.8 | ---- |
| 500 | 357 | 5,605 | −18.6 | ---- | 354 | 5,831 | −10.2 | ---- | 348 | 5,871 | −7.5 | ---- | 359 | 5,748 | −13.7 | ---- | 355 | 5,561 | −20.5 | ---- | 358 | 5,615 | −20.3 | 44 | 353 | 5,880 | −6.4 | ---- |
| 450 | 357 | 6,387 | −23.9 | ---- | 349 | 6,642 | −15.6 | ---- | 343 | 6,690 | −13.0 | ---- | 358 | 6,548 | −19.4 | ---- | 348 | 6,341 | −25.7 | ---- | 354 | 6,393 | −25.7 | 43 | 351 | 6,702 | −11.7 | ---- |
| 400 | 357 | 7,233 | −29.9 | ---- | 347 | 7,514 | −21.8 | ---- | 340 | 7,571 | −19.3 | ---- | 358 | 7,405 | −26.0 | ---- | 341 | 7,183 | −31.6 | ---- | 353 | 7,231 | −31.8 | ---- | 346 | 7,588 | −17.9 | ---- |
| 350 | 354 | 8,170 | −36.6 | ---- | 341 | 8,483 | −28.8 | ---- | 338 | 8,550 | −26.4 | ---- | 356 | 8,356 | −33.1 | ---- | 335 | 8,112 | −38.1 | ---- | 350 | 8,161 | −38.6 | ---- | 342 | 8,572 | −25.2 | ---- |
| 300 | 350 | 9,221 | −43.7 | ---- | 331 | 9,569 | −36.9 | ---- | 336 | 9,645 | −34.8 | ---- | 348 | 9,424 | −41.0 | ---- | 313 | 9,161 | −45.0 | ---- | 335 | 9,205 | −45.7 | ---- | 341 | 9,672 | −33.7 | ---- |
| 250 | 338 | 10,426 | −50.6 | ---- | 308 | 10,808 | −45.9 | ---- | 325 | 10,893 | −44.5 | ---- | 344 | 10,642 | −49.2 | ---- | 269 | 10,376 | −51.3 | ---- | 311 | 10,401 | −52.0 | ---- | 336 | 10,925 | −43.5 | ---- |
| 200 | 306 | 11,862 | −54.6 | ---- | 267 | 12,261 | −55.1 | ---- | 311 | 12,350 | −55.8 | ---- | 325 | 12,084 | −55.6 | ---- | 212 | 11,822 | −54.7 | ---- | 258 | 11,831 | −54.7 | ---- | 330 | 12,388 | −54.8 | ---- |
| 175 | 281 | 12,749 | −55.4 | ---- | 237 | 13,102 | −58.9 | ---- | 292 | 13,189 | −61.8 | ---- | 302 | 12,930 | −57.5 | ---- | | | | | 217 | 12,686 | −54.4 | ---- | 321 | 13,229 | −60.9 | ---- |
| 150 | 267 | 13,729 | −56.2 | ---- | 196 | 14,077 | −63.0 | ---- | 274 | 14,130 | −67.6 | ---- | 291 | 14,238 | −59.7 | ---- | | | | | 165 | 13,672 | −54.5 | ---- | 288 | 14,173 | −66.9 | ---- |
| 125 | 226 | 14,881 | −57.3 | ---- | 147 | 15,194 | −66.8 | ---- | 225 | 15,214 | −72.6 | ---- | 248 | 15,032 | −62.0 | ---- | | | | | 115 | 14,842 | −54.8 | ---- | 213 | 15,260 | −72.4 | ---- |
| 100 | 170 | 16,290 | −58.2 | ---- | 79 | 16,524 | −69.8 | ---- | 164 | 16,514 | −75.8 | ---- | 202 | 16,418 | −64.1 | ---- | | | | | | | | | | | | |

| | Tacubaya, Mex. (773.9 mb.) | | | | Tampa, Fla. (1,017.6 mb.) | | | | Tatoosh Island, Wash. (1,013.2 mb.) | | | | Toledo, Ohio (994.2 mb.) | | | | Washington, D. C. (1,015.8 mb.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity | Number of observations | Dynamic height | Temperature | Relative humidity |
| Surface | 358 | 2,306 | 16.6 | 52 | 362 | 9 | 21.2 | 82 | 364 | 31 | 8.9 | 85 | 365 | 191 | 9.7 | 78 | 364 | 25 | 14.1 | 70 |
| 1,000 | 358 | 57 | (*) | ---- | 362 | 160 | 21.6 | 75 | 364 | 139 | 8.7 | 80 | 365 | 141 | (*) | ---- | 364 | 157 | 14.0 | 66 |
| 950 | 358 | 521 | (*) | ---- | 362 | 606 | 19.5 | 70 | 364 | 567 | 7.6 | 72 | 365 | 573 | 10.1 | 65 | 364 | 592 | 12.2 | 63 |
| 900 | 358 | 999 | (*) | ---- | 362 | 1,069 | 16.9 | 66 | 364 | 1,007 | 5.8 | 66 | 365 | 1,018 | 7.8 | 62 | 364 | 1,040 | 9.8 | 64 |
| 850 | 358 | 1,494 | (*) | ---- | 362 | 1,555 | 14.2 | 63 | 364 | 1,473 | 3.4 | 64 | 365 | 1,487 | 5.7 | 58 | 364 | 1,514 | 7.5 | 62 |
| 800 | 358 | 2,023 | (*) | ---- | 362 | 2,065 | 11.8 | 55 | 364 | 1,963 | 1.0 | 60 | 365 | 1,982 | 3.5 | 54 | 364 | 2,012 | 5.1 | 59 |
| 750 | 358 | 2,575 | 15.0 | 51 | 362 | 2,607 | 9.1 | 49 | 364 | 2,485 | −1.7 | 56 | 365 | 2,510 | 1.1 | 50 | 364 | 2,541 | 2.8 | 56 |
| 700 | 358 | 3,153 | 10.7 | 56 | 361 | 3,172 | 6.3 | ---- | 363 | 3,025 | −4.7 | 53 | 365 | 3,057 | −1.6 | 47 | 364 | 3,093 | .2 | 52 |
| 650 | 358 | 3,771 | 6.1 | 61 | 360 | 3,780 | 3.0 | ---- | 363 | 3,609 | −7.9 | 50 | 365 | 3,650 | −4.7 | 44 | 363 | 3,688 | −3.0 | 48 |
| 600 | 357 | 4,418 | 1.5 | 63 | 358 | 4,420 | −.8 | ---- | 363 | 4,223 | −11.6 | 48 | 363 | 4,269 | −8.3 | 42 | 362 | 4,314 | −6.5 | 46 |
| 550 | 353 | 5,117 | −2.8 | 63 | 358 | 5,110 | −4.9 | ---- | 360 | 4,888 | −15.6 | 45 | 360 | 4,942 | −12.3 | 38 | 362 | 4,991 | −10.5 | 42 |
| 500 | 352 | 5,865 | −7.2 | ---- | 358 | 5,853 | −9.5 | ---- | 358 | 5,598 | −20.2 | 44 | 358 | 5,661 | −17.1 | ---- | 362 | 5,716 | −15.1 | 38 |
| 450 | 347 | 6,690 | −12.3 | ---- | 356 | 6,665 | −14.9 | ---- | 358 | 6,375 | −25.4 | 45 | 356 | 6,450 | −22.5 | ---- | 358 | 6,511 | −20.3 | ---- |
| 400 | 344 | 7,570 | −18.4 | ---- | 354 | 7,540 | −21.1 | ---- | 354 | 7,217 | −31.3 | 43 | 353 | 7,299 | −28.5 | ---- | 358 | 7,450 | −26.3 | ---- |
| 350 | 335 | 8,552 | −26.0 | ---- | 346 | 8,513 | −28.3 | ---- | 352 | 8,149 | −37.8 | ---- | 346 | 8,241 | −35.8 | ---- | 358 | 8,318 | −33.1 | ---- |
| 300 | 321 | 9,649 | −34.6 | ---- | 339 | 9,598 | −36.7 | ---- | 345 | 9,190 | −44.7 | ---- | 341 | 9,300 | −42.7 | ---- | 353 | 9,385 | −40.6 | ---- |
| 250 | 314 | 10,897 | −40.9 | ---- | 322 | 10,835 | −46.6 | ---- | 334 | 10,400 | −51.1 | ---- | 334 | 10,509 | −50.2 | ---- | 351 | 10,604 | −48.6 | ---- |
| 200 | 294 | 12,355 | −56.0 | ---- | 295 | 12,282 | −56.9 | ---- | 303 | 11,925 | −54.4 | ---- | 314 | 11,944 | −56.0 | ---- | 346 | 12,045 | −58.4 | ---- |
| 175 | 267 | 13,194 | −62.0 | ---- | 272 | 13,120 | −61.8 | ---- | 277 | 12,693 | −53.9 | ---- | 298 | 12,787 | −57.6 | ---- | 337 | 12,889 | −58.4 | ---- |
| 150 | 198 | 14,130 | −67.5 | ---- | 255 | 14,066 | −66.0 | ---- | 245 | 13,680 | −53.8 | ---- | 258 | 13,758 | −59.4 | ---- | 314 | 13,851 | −60.2 | ---- |
| 125 | | | | | 223 | 16,160 | −70.0 | ---- | 204 | 14,846 | −54.5 | ---- | 210 | 14,896 | −61.2 | ---- | 266 | 14,979 | −62.3 | ---- |
| 100 | | | | | 163 | 16,482 | −72.3 | ---- | | | | | 142 | 16,270 | −61.8 | ---- | 210 | 16,348 | −63.2 | ---- |
| 80 | | | | | 84 | 17,778 | −71.5 | ---- | | | | | 74 | 17,608 | −60.7 | ---- | | | | |

[1] Station elevation changed from 13 meters to 18 meters, August 17, 1949.
[2] Station elevation changed from 15 meters to 19 meters, November 8, 1949.
*Temperature and relative humidity data for this level are not available or are available only for certain days. See note entitled "Change in Summarization of Radiosonde Data," p. 6, in the January 1946 issue of the MONTHLY WEATHER REVIEW.

NOTE.—All observations scheduled between 0300 and 0500, G. C. T., except at Ciudad Victoria, Mazatlan, and Merida, where they are taken near 0200, G. C. T. "Number of observations" refers to those of dynamic height only. (In a few cases temperature or humidity data may be missing for one or more standard pressure surfaces of some observations.) Relative humidity data are not published for standard pressure surfaces having a corresponding mean temperature below −20° C. Relative humidity data beginning with Oct. 1, 1948, were computed, and expressed in these tables, on the basis of vapor pressure over water. Upper air values of relative humidity at levels with temperatures less than 0° C. have formerly been computed and expressed on the basis of the vapor pressure over ice. All relative humidity observations are obtained by electric hygrometer and have been adjusted to compensate for the values occurring below the operating range of the humidity element. For explantation of the adjustment see article entitled "Curve Method for Obtaining Monthly Means of Relative Humidity," p. 241, MONTHLY WEATHER REVIEW, December 1944.

None of the means included in these tables are based on less than 15 observations at the surface or 5 observations at a standard pressure level.

TABLE 2A.—*Free-air resultant winds based on pilot balloon observations made near 2200 G. C. T., during the year 1949. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Speeds in meters per second*

| Altitude (meters) m. s. l. | Abilene, Tex. (534 m.) | | | Albuquerque, N. Mex. (1,627 m.) | | | Atlanta, Ga. (299 m.) | | | Billings, Mont. (1,095 m.) | | | Bismarck, N. Dak. (505 m.) | | | Boise, Idaho (868 m.) | | | Brownsville, Tex. (7 m.) | | | Buffalo, N. Y. (220 m.) | | | Burlington, Vt. (100 m.) | | | Charleston, S. C. (16 m.) | | | Cincinnati, Ohio (273 m.) | | | El Paso, Tex. (1,198 m.) | | | Ely, Nev. (1,910 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 348 | 170 | 1.9 | 355 | 222 | 1.5 | 341 | 280 | 0.8 | 352 | 268 | 1.7 | 350 | 283 | 1.6 | 356 | 324 | 2.4 | 346 | 124 | 4.3 | 343 | 250 | 3.1 | 350 | 238 | 1.2 | 351 | 202 | 1.1 | 348 | 243 | 1.8 | 364 | 224 | 1.7 | 355 | 223 | 1.5 |
| 500 | | | | | | | 341 | 272 | 1.0 | | | | | | | | | | 346 | 134 | 5.0 | 343 | 249 | 4.9 | 350 | 236 | 3.2 | 351 | 209 | 2.0 | 348 | 240 | 2.7 | | | | | | |
| 1,000 | 348 | 184 | 2.7 | | | | 328 | 259 | 1.8 | | | | 348 | 281 | 3.1 | 356 | 319 | 2.2 | 304 | 155 | 4.3 | 305 | 248 | 6.5 | 337 | 254 | 4.9 | 319 | 244 | 3.0 | 328 | 242 | 4.1 | | | | | | |
| 1,500 | 327 | 205 | 3.5 | | | | 299 | 271 | 3.0 | 352 | 264 | 3.8 | 324 | 280 | 4.5 | 355 | 295 | 1.9 | 254 | 171 | 2.7 | 268 | 255 | 7.5 | 300 | 265 | 6.7 | 306 | 266 | 4.3 | 316 | 251 | 5.4 | 364 | 234 | 2.1 | | | |
| 2,000 | 308 | 227 | 4.4 | 364 | 226 | 2.6 | 281 | 281 | 4.7 | 345 | 275 | 5.3 | 306 | 281 | 6.2 | 354 | 277 | 2.7 | | | | 229 | 260 | 8.1 | 254 | 272 | 8.6 | 274 | 276 | 5.6 | 289 | 260 | 6.7 | 360 | 239 | 2.5 | 355 | 226 | 1.6 |
| 2,500 | 291 | 237 | 5.1 | 364 | 244 | 3.3 | 255 | 283 | 6.1 | 332 | 277 | 6.7 | 289 | 283 | 7.8 | 338 | 266 | 3.7 | | | | | | | 218 | 275 | 9.9 | 261 | 280 | 6.9 | 259 | 266 | 8.0 | 347 | 246 | 3.2 | 353 | 231 | 2.4 |
| 3,000 | 277 | 251 | 5.6 | 342 | 255 | 4.4 | 242 | 284 | 7.1 | 316 | 276 | 8.3 | 278 | 284 | 9.2 | 323 | 263 | 4.6 | | | | | | | 194 | 281 | 11.1 | 250 | 279 | 8.0 | 223 | 272 | 9.0 | 340 | 251 | 4.2 | 344 | 238 | 2.9 |
| 4,000 | 261 | 257 | 7.9 | 334 | 265 | 6.5 | 211 | 280 | 9.5 | 282 | 279 | 10.6 | 253 | 286 | 12.0 | 293 | 259 | 6.0 | | | | | | | | | | 224 | 275 | 9.4 | 183 | 279 | 10.3 | 319 | 256 | 6.5 | 301 | 254 | 4.4 |
| 5,000 | 220 | 265 | 9.4 | 307 | 267 | 8.4 | 166 | 282 | 11.6 | 239 | 283 | 12.6 | 201 | 283 | 13.0 | 261 | 263 | 7.4 | | | | | | | | | | 192 | 274 | 10.3 | 136 | 280 | 11.6 | 297 | 257 | 8.3 | 257 | 259 | 6.2 |
| 6,000 | 177 | 273 | 9.9 | 289 | 266 | 9.8 | 131 | 281 | 13.4 | 182 | 282 | 12.2 | 141 | 285 | 14.0 | 208 | 269 | 8.0 | | | | | | | | | | 164 | 277 | 11.8 | | | | 267 | 259 | 9.8 | 224 | 268 | 8.6 |
| 8,000 | | | | 239 | 266 | 12.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | 187 | 263 | 13.6 | | | |
| 10,000 | | | | 164 | 271 | 12.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Altitude (meters) m. s. l. | Grand Junction, Colo. (1,475 m.) | | | Greensboro, N. C. (271 m.) | | | Havre, Mont. (767 m.) | | | Jacksonville, Fla. (16 m.) | | | Joliet, Ill. (178 m.) | | | Las Vegas, Nev. (663 m.) | | | Little Rock, Ark. (88 m.) | | | Medford, Oreg. (416 m.) | | | Miami, Fla. (12 m.) | | | Mobile, Ala. (66 m.) | | | Nashville, Tenn. (182 m.) | | | New York, N. Y. (15 m.) | | | Oakland, Calif. (3 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 361 | 277 | 1.3 | 329 | 263 | 0.8 | 350 | 273 | 2.3 | 334 | 87 | 1.5 | 342 | 234 | 2.0 | 364 | 213 | 1.3 | 335 | 186 | 0.5 | 355 | 306 | 1.4 | 359 | 106 | 3.0 | 331 | 155 | 0.8 | 345 | 249 | 0.8 | 349 | 269 | 1.3 | 357 | 271 | 3.9 |
| 500 | | | | 329 | 255 | 1.6 | | | | 334 | 131 | .6 | 342 | 240 | 3.0 | | | | 335 | 213 | 1.2 | 353 | 305 | 1.4 | 358 | 107 | 3.6 | 328 | 182 | 1.1 | 345 | 228 | 1.6 | 349 | 256 | 3.2 | 357 | 288 | 2.6 |
| 1,000 | | | | 324 | 252 | 2.9 | 350 | 267 | 4.0 | 325 | 232 | 1.4 | 305 | 246 | 4.4 | 364 | 204 | 1.6 | 316 | 238 | 2.2 | 353 | 277 | .9 | 356 | 106 | 2.5 | 279 | 271 | .9 | 327 | 232 | 2.7 | 323 | 277 | 5.0 | 331 | 286 | 1.8 |
| 1,500 | 361 | 277 | 1.5 | 307 | 265 | 4.4 | 347 | 270 | 5.9 | 297 | 256 | 3.0 | 277 | 255 | 5.8 | 363 | 221 | 1.9 | 297 | 256 | 3.5 | 344 | 233 | 1.7 | 340 | 94 | 1.1 | 251 | 295 | 1.9 | 301 | 256 | 4.2 | 300 | 283 | 6.7 | 317 | 282 | 1.7 |
| 2,000 | 361 | 267 | 2.1 | 293 | 280 | 6.1 | 334 | 276 | 6.7 | 274 | 272 | 4.1 | 254 | 263 | 7.2 | 358 | 230 | 2.6 | 271 | 267 | 4.7 | 323 | 234 | 2.2 | 318 | 79 | .3 | 207 | 294 | 3.5 | 282 | 259 | 5.6 | 264 | 287 | 8.2 | 308 | 294 | 1.8 |
| 2,500 | 358 | 248 | 2.6 | 271 | 284 | 7.9 | 309 | 278 | 7.5 | 258 | 274 | 5.0 | 226 | 269 | 8.2 | 351 | 234 | 3.0 | 250 | 271 | 6.3 | 288 | 236 | 2.1 | 286 | 278 | .4 | 176 | 290 | 4.7 | 260 | 264 | 6.7 | 239 | 288 | 9.5 | 298 | 295 | 2.3 |
| 3,000 | 345 | 248 | 3.8 | 256 | 285 | 9.3 | 260 | 279 | 8.2 | 237 | 275 | 6.1 | 202 | 276 | 9.0 | 345 | 240 | 3.6 | 215 | 279 | 7.0 | 265 | 252 | 2.7 | 268 | 267 | .9 | 154 | 280 | 6.1 | 244 | 272 | 8.0 | 197 | 290 | 9.6 | 290 | 292 | 3.1 |
| 4,000 | 310 | 263 | 5.4 | 220 | 284 | 11.0 | | | | 182 | 281 | 8.0 | 154 | 279 | 10.7 | 327 | 255 | 4.6 | 153 | 281 | 9.9 | | | | 235 | 263 | 2.8 | | | | 206 | 275 | 10.3 | | | | 272 | 292 | 4.4 |
| 5,000 | 274 | 275 | 7.3 | 188 | 284 | 12.5 | | | | | | | | | | 312 | 265 | 5.6 | | | | | | | 181 | 269 | 4.6 | | | | 172 | 277 | 12.2 | | | | 253 | 293 | 6.0 |
| 6,000 | 238 | 278 | 9.0 | | | | | | | | | | | | | 282 | 269 | 7.1 | | | | | | | | | | | | | | | | | | 229 | 289 | 7.1 |
| 8,000 | 169 | 282 | 12.3 | | | | | | | | | | | | | 225 | 272 | 8.9 | | | | | | | | | | | | | | | | | | 181 | 281 | 8.4 |

| Altitude (meters) m. s. l. | Oklahoma City, Okla. (396 m.) | | | Omaha, Nebr. (306 m.) | | | Phoenix, Ariz. (338 m.) | | | Rapid City, S. Dak. (982 m.) | | | St. Cloud, Minn. (318 m.) | | | St. Louis, Mo. (181 m.) | | | San Antonio, Tex. (240 m.) | | | San Diego, Calif. (13 m.) | | | Sault Ste. Marie, Mich. (221 m.) | | | Seattle, Wash. (116 m.) | | | Spokane, Wash. (725 m.) | | | Washington, D. C. (24 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 334 | 188 | 2.5 | 347 | 227 | 1.1 | 365 | 227 | 0.8 | 354 | 332 | 1.8 | 340 | 261 | 1.9 | 338 | 221 | 1.1 | 338 | 119 | 1.7 | 356 | 271 | 3.3 | 335 | 280 | 2.1 | 342 | 242 | 1.6 | 346 | 223 | 2.2 | 343 | 248 | 1.5 |
| 500 | 334 | 189 | 2.7 | 347 | 221 | 1.7 | 365 | 236 | 1.1 | | | | 340 | 259 | 2.4 | 338 | 237 | 2.0 | 338 | 132 | 2.0 | 354 | 273 | 2.3 | 335 | 267 | 2.9 | 342 | 229 | 2.4 | | | | | | | 343 | 256 | 2.8 |
| 1,000 | 328 | 203 | 3.5 | 329 | 231 | 2.9 | 364 | 230 | 1.4 | 354 | 330 | 1.8 | 330 | 261 | 3.6 | 322 | 243 | 3.7 | 332 | 150 | 2.0 | 327 | 272 | 1.2 | 299 | 262 | 4.2 | 314 | 226 | 2.9 | 345 | 223 | 3.4 | 332 | 263 | 4.3 |
| 1,500 | 311 | 225 | 4.4 | 306 | 249 | 4.7 | 361 | 220 | 1.8 | 353 | 303 | 3.2 | 302 | 267 | 5.3 | 298 | 258 | 5.3 | 303 | 185 | 1.7 | 303 | 276 | .8 | 250 | 269 | 5.1 | 283 | 223 | 3.1 | 333 | 232 | 4.4 | 320 | 271 | 5.7 |
| 2,000 | 295 | 244 | 5.5 | 282 | 262 | 6.1 | 355 | 226 | 2.4 | 332 | 289 | 4.5 | 266 | 274 | 7.4 | 271 | 269 | 6.6 | 287 | 216 | 2.5 | 295 | 272 | 1.2 | 232 | 275 | 6.5 | 259 | 233 | 3.0 | 308 | 243 | 4.5 | 289 | 278 | 7.3 |
| 2,500 | 281 | 254 | 6.8 | 259 | 274 | 7.3 | 343 | 231 | 2.7 | 320 | 285 | 6.1 | 243 | 276 | 8.7 | 241 | 275 | 7.6 | 256 | 242 | 3.1 | 280 | 274 | 1.5 | 187 | 282 | 7.9 | 223 | 240 | 3.2 | 287 | 253 | 4.7 | 262 | 281 | 8.7 |
| 3,000 | 265 | 262 | 7.7 | 249 | 282 | 8.3 | 335 | 235 | 3.3 | 307 | 287 | 7.8 | 228 | 283 | 10.0 | 219 | 281 | 8.7 | 239 | 260 | 3.8 | 274 | 271 | 2.5 | | | | 188 | 251 | 3.9 | 258 | 257 | 5.1 | 250 | 282 | 10.0 |
| 4,000 | 241 | 271 | 9.3 | 210 | 288 | 11.2 | 320 | 246 | 4.5 | 262 | 284 | 10.3 | 193 | 281 | 12.3 | 189 | 283 | 10.6 | 214 | 269 | 5.7 | 252 | 272 | 4.3 | | | | | | | 224 | 264 | 6.9 | 215 | 279 | 12.6 |
| 5,000 | 212 | 279 | 9.6 | | | | 290 | 252 | 5.6 | 217 | 280 | 11.9 | 154 | 284 | 14.8 | | | | 173 | 270 | 8.1 | 227 | 271 | 5.8 | | | | | | | 181 | 271 | 8.9 | 186 | 282 | 13.7 |
| 6,000 | 167 | 286 | 10.6 | | | | 263 | 257 | 7.0 | 174 | 282 | 13.6 | | | | | | | | | | 212 | 267 | 6.7 | | | | | | | | | | 145 | 285 | 14.2 | | | |
| 8,000 | | | | | | | 184 | 266 | 8.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

TABLE 3A.—*Free-air resultant winds based on rawin observations made near 0300 G. C. T., during the year 1949. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Speeds in meters per second*

| Altitude (meters) m. s. l. | Albuquerque, N. Mex. (1,636 m.) | | | Big Spring, Tex. (774 m.) | | | Bismarck, N. Dak. (505 m.) | | | Brownsville, Tex. (7 m.) | | | Caribou, Maine (191 m.) | | | Charleston, S. C. (13 m.) | | | Columbia, Mo. (237 m.) | | | Grand Junction, Colo. (1,473 m.) | | | Greensboro, N. C. (275 m.) | | | Hatteras, N. C. (3 m.) | | | International Falls, Minn. (358 m.) | | | Little Rock, Ark. (80 m.) | | | Medford, Oreg. (401 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 365 | 131 | 1.2 | 362 | 141 | 3.1 | 363 | 16 | 0.8 | 361 | 118 | 2.5 | 365 | 267 | 1.5 | 365 | 210 | 0.4 | 364 | 145 | 0.7 | 365 | 60 | 0.2 | 364 | 282 | 0.3 | 365 | 245 | 0.7 | 365 | 246 | 0.7 | 365 | 218 | 0.4 | 364 | 323 | 1.6 |
| 500 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 355 | 130 | 5.9 | 365 | 265 | 4.4 | 363 | 219 | 2.0 | 364 | 198 | 2.6 | --- | --- | --- | 361 | 243 | 1.6 | 363 | 241 | 2.5 | 362 | 238 | 1.8 | 360 | 174 | 2.1 | 360 | 320 | 2.0 |
| 1,000 | --- | --- | --- | 361 | 159 | 4.9 | 358 | 300 | 2.1 | 354 | 140 | 5.2 | 365 | 274 | 6.1 | 361 | 236 | 2.5 | 361 | 234 | 4.0 | --- | --- | --- | 360 | 251 | 3.6 | 360 | 250 | 3.3 | 362 | 263 | 4.1 | 359 | 214 | 3.1 | 359 | 305 | 2.3 |
| 1,500 | --- | --- | --- | 361 | 185 | 5.0 | 356 | 291 | 4.2 | 353 | 152 | 3.8 | 360 | 275 | 7.2 | 360 | 254 | 3.3 | 360 | 252 | 5.3 | 363 | 60 | .2 | 358 | 261 | 4.7 | 353 | 261 | 4.1 | 359 | 281 | 5.3 | 356 | 233 | 4.1 | 357 | 276 | 2.1 |
| 2,000 | 364 | 242 | 2.1 | 360 | 214 | 4.7 | 353 | 299 | 6.0 | 354 | 172 | 2.8 | 355 | 275 | 8.3 | 360 | 263 | 4.1 | 358 | 264 | 6.4 | 363 | 230 | 1.1 | 357 | 266 | 5.6 | 347 | 268 | 5.0 | 359 | 281 | 6.5 | 353 | 245 | 5.1 | 355 | 260 | 2.6 |
| 2,500 | 364 | 254 | 3.6 | 360 | 234 | 5.0 | 351 | 293 | 7.5 | 354 | 193 | 2.5 | 348 | 274 | 9.7 | 357 | 268 | 5.1 | 355 | 270 | 7.3 | 363 | 235 | 2.4 | 356 | 270 | 6.8 | 343 | 267 | 6.0 | 356 | 285 | 7.7 | 345 | 251 | 6.1 | 348 | 259 | 3.8 |
| 3,000 | 362 | 259 | 4.7 | 360 | 248 | 5.6 | 350 | 293 | 8.8 | 351 | 213 | 2.7 | 346 | 271 | 11.1 | 353 | 268 | 6.0 | 351 | 274 | 8.1 | 364 | 245 | 3.6 | 354 | 269 | 7.9 | 337 | 268 | 7.0 | 356 | 288 | 9.0 | 342 | 255 | 7.3 | 347 | 256 | 4.5 |
| 4,000 | 361 | 265 | 6.5 | 358 | 262 | 6.8 | 344 | 291 | 11.1 | 349 | 242 | 3.9 | 336 | 270 | 13.4 | 344 | 268 | 7.4 | 342 | 279 | 9.6 | 362 | 260 | 5.3 | 346 | 269 | 9.7 | 322 | 268 | 9.2 | 343 | 283 | 11.4 | 332 | 259 | 9.0 | 342 | 267 | 6.0 |
| 5,000 | 354 | 269 | 7.6 | 348 | 263 | 8.3 | 338 | 287 | 12.4 | 352 | 247 | 5.5 | 320 | 268 | 15.1 | 329 | 268 | 8.6 | 330 | 278 | 11.6 | 357 | 265 | 7.2 | 340 | 270 | 11.4 | 312 | 271 | 10.7 | 330 | 281 | 13.9 | 323 | 262 | 10.1 | 328 | 272 | 7.9 |
| 6,000 | 344 | 272 | 8.8 | 332 | 260 | 8.8 | 330 | 282 | 14.1 | 347 | 251 | 7.1 | 305 | 268 | 16.8 | 311 | 270 | 9.5 | 316 | 277 | 12.9 | 351 | 269 | 9.0 | 321 | 273 | 12.7 | 292 | 273 | 11.8 | 319 | 276 | 15.4 | 307 | 260 | 11.3 | 304 | 272 | 8.8 |
| 8,000 | 300 | 273 | 10.1 | 309 | 261 | 11.9 | 289 | 271 | 16.3 | 335 | 255 | 10.8 | 256 | 268 | 18.8 | 265 | 276 | 10.5 | 270 | 271 | 14.9 | 305 | 272 | 11.4 | 291 | 272 | 15.4 | 249 | 277 | 13.0 | 278 | 273 | 18.1 | 274 | 254 | 14.3 | 241 | 258 | 10.9 |
| 10,000 | 256 | 274 | 12.3 | --- | --- | --- | 243 | 264 | 17.3 | 296 | 261 | 13.6 | --- | --- | --- | 223 | 281 | 11.5 | --- | --- | --- | 236 | 271 | 12.8 | 237 | 274 | 16.6 | 182 | 282 | 12.1 | 221 | 274 | 20.1 | --- | --- | --- | --- | --- | --- |
| 12,000 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 216 | 270 | 12.3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 142 | 273 | 22.1 | --- | --- | --- | --- | --- | --- |

| Altitude (meters) m. s. l. | Miami, Fla. (12 m.) | | | Nantucket, Mass. (13 m.) | | | Nashville, Tenn. (180 m.) | | | New Orleans, La. (6 m.) | | | Oakland, Calif. (8 m.) | | | Oklahoma City, Okla. (392 m.) | | | RapidCity, S. Dak. (980 m.) | | | St. Cloud, Minn. (318 m.) | | | San Antonio, Tex. (242 m.) | | | San Juan, P. R. (28 m.) | | | Santa Maria, Calif. (72 m.) | | | Sault Ste. Marie, Mich. (221 m.) | | | Spokane, Wash. (726 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed | Observations | Direction | Speed |
| Surface | 365 | 80 | 1.2 | 352 | 257 | 1.2 | 365 | 208 | 0.5 | 363 | 113 | 0.8 | 365 | 277 | 3.0 | 353 | 138 | 2.0 | 359 | 295 | 0.9 | 362 | 322 | 0.4 | 364 | 93 | 2.6 | 364 | 98 | 2.9 | 365 | 281 | 1.6 | 362 | 306 | 0.6 | 357 | 205 | 1.7 |
| 500 | 364 | 105 | 3.5 | 349 | 262 | 4.7 | 363 | 207 | 2.2 | 360 | 144 | 1.9 | 364 | 288 | 3.1 | 330 | 150 | 2.6 | --- | --- | --- | 359 | 238 | 1.1 | 364 | 119 | 4.2 | 361 | 90 | 6.4 | 363 | 331 | 2.7 | 362 | 250 | 1.8 | --- | --- | --- |
| 1,000 | 364 | 105 | 3.2 | 347 | 274 | 5.4 | 362 | 228 | 3.8 | 357 | 170 | 1.3 | 364 | 289 | 2.8 | 325 | 192 | 4.0 | 356 | 290 | .8 | 358 | 256 | 3.3 | 364 | 143 | 4.5 | 359 | 90 | 6.6 | 364 | 337 | 2.6 | 358 | 259 | 4.4 | 354 | 222 | 3.1 |
| 1,500 | 364 | 99 | 2.4 | 346 | 274 | 6.3 | 356 | 249 | 4.6 | 358 | 208 | 1.3 | 363 | 292 | 2.3 | 329 | 226 | 4.4 | 357 | 291 | 3.0 | 349 | 267 | 5.1 | 364 | 174 | 3.4 | 355 | 89 | 6.0 | 363 | 351 | 2.1 | 351 | 268 | 5.9 | 349 | 241 | 4.2 |
| 2,000 | 364 | 105 | 1.7 | 340 | 273 | 8.0 | 354 | 259 | 6.0 | 359 | 238 | 2.3 | 363 | 294 | 2.1 | 333 | 248 | 5.1 | 355 | 290 | 4.5 | 344 | 273 | 6.3 | 364 | 210 | 3.1 | 355 | 87 | 5.5 | 362 | 341 | 2.1 | 346 | 278 | 7.0 | 348 | 251 | 4.7 |
| 2,500 | 365 | 127 | 1.1 | 337 | 271 | 9.2 | 353 | 263 | 7.2 | 352 | 248 | 3.5 | 363 | 294 | 2.6 | 335 | 255 | 5.9 | 354 | 288 | 6–2 | 339 | 286 | 7.1 | 362 | 235 | 3.9 | 353 | 87 | 5.2 | 361 | 319 | 2.8 | 340 | 281 | 8.3 | 339 | 260 | 4.8 |
| 3,000 | 365 | 169 | .6 | 333 | 270 | 10.3 | 350 | 267 | 8.8 | 351 | 254 | 4.5 | 361 | 291 | 3.3 | 334 | 262 | 6.8 | 345 | 287 | 7.6 | 341 | 285 | 8.5 | 357 | 248 | 4.5 | 352 | 85 | 4.8 | 361 | 304 | 3.7 | 335 | 276 | 9.5 | 334 | 267 | 5.6 |
| 4,000 | 360 | 248 | 1.5 | 322 | 269 | 12.3 | 342 | 271 | 10.7 | 344 | 252 | 7.0 | 356 | 290 | 4.6 | 330 | 269 | 7.7 | 322 | 284 | 9.9 | 333 | 282 | 10.6 | 356 | 256 | 6.4 | 349 | 80 | 3.8 | 357 | 293 | 5.4 | 321 | 279 | 12.0 | 326 | 269 | 7.7 |
| 5,000 | 356 | 269 | 3.3 | 304 | 268 | 14.1 | 329 | 270 | 12.1 | 335 | 261 | 9.2 | 346 | 289 | 5.9 | 325 | 269 | 8.6 | 309 | 283 | 11.2 | 324 | 278 | 12.6 | 347 | 259 | 8.3 | 344 | 66 | 2.5 | 351 | 284 | 7.0 | 301 | 282 | 13.4 | 314 | 272 | 9.8 |
| 6,000 | 354 | 274 | 4.8 | 283 | 269 | 15.0 | 309 | 270 | 12.8 | 322 | 262 | 11.0 | 332 | 290 | 7.7 | 320 | 271 | 10.3 | 290 | 280 | 13.0 | 309 | 278 | 13.3 | 332 | 260 | 10.0 | 336 | 48 | 2.0 | 341 | 285 | 8.2 | 273 | 279 | 14.6 | 293 | 272 | 10.6 |
| 8,000 | 341 | 279 | 8.6 | 178 | 272 | 17.5 | 257 | 268 | 14.6 | 278 | 263 | 13.3 | 295 | 280 | 9.7 | 275 | 271 | 12.3 | 258 | 257 | 9.5 | 269 | 276 | 15.9 | 294 | 264 | 13.1 | 322 | 299 | 3.5 | 316 | 280 | 9.7 | --- | --- | --- | 230 | 266 | 11.6 |
| 10,000 | 321 | 281 | 9.7 | --- | --- | --- | --- | --- | --- | 230 | 265 | 14.9 | 246 | 278 | 11.4 | 243 | 271 | 14.0 | --- | --- | --- | 225 | 273 | 17.7 | --- | --- | --- | 315 | 285 | 9.3 | 279 | 266 | 12.6 | --- | --- | --- | --- | --- | --- |
| 12,000 | 280 | 282 | 11.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 298 | 280 | 14.4 | 227 | 263 | 13.9 | --- | --- | --- | --- | --- | --- |
| 14,000 | 203 | 297 | 9.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 249 | 282 | 12.2 | 179 | 264 | 12.4 | --- | --- | --- | --- | --- | --- |

| Altitude (meters) m. s. l. | Tatoosh Island, Wash. (33 m.) | | | Altitude (meters) m. s. l. | Tatoosh Island, Wash. (33 m.) | | |
|---|---|---|---|---|---|---|---|
| | Observations | Direction | Speed | | Observations | Direction | Speed |
| Surface | 351 | 166 | 1.5 | 5,000 | 307 | 268 | 9.0 |
| 500 | 344 | 229 | 2.2 | 6,000 | 289 | 269 | 10.1 |
| 1,000 | 338 | 236 | 2.9 | 8,000 | 245 | 272 | 12.2 |
| 1,500 | 337 | 239 | 3.4 | 10,000 | 189 | 266 | 12.2 |
| 2,000 | 338 | 249 | 4.1 | 12,000 | --- | --- | --- |
| 2,500 | 336 | 257 | 4.9 | 14,000 | --- | --- | --- |
| 3,000 | 331 | 262 | 5.9 | 16,000 | --- | --- | --- |
| 4,000 | 321 | 264 | 7.8 | | | | |

NOTE.—Resultants prepared from rawins at high altitudes are biased toward lower wind speeds. Values appearing in this table should therefore be used with caution when the number of observations missing is greater than three. See note following Table 3 in the June 1948 issue of the MONTHLY WEATHER REVIEW.

## RIVER STAGES AND FLOODS FOR DECEMBER 1949

The highest crests since 1937 occurred along the Green River in Kentucky during December. Flooding elsewhere was mostly light except along the Wabash River where overflows were moderate. A serious flood threat was averted in the Puget Sound drainage by the onset of colder weather.

*Atlantic Slope drainage.*—Precipitation averaged mostly below normal along the Atlantic Slope drainage during the last 3 months of 1949 except in Pennsylvania. Despite the deficient rainfall, rivers in the northern portion of the New England States were slightly higher at the end of the month than in the beginning due mostly to runoff from snowmelt. By the 31st most of the snow cover in the headwater areas had disappeared.

General rains over the upper reaches of the Delaware River, together with some melting of the snow cover caused a sharp rise at Port Jervis, N. Y., and Trenton, N. J., on the 14th and 15th but flood stages were not reached. Light flooding occurred in the Graters Ford area for a few hours on the 27th due to heavy local rains over Perkiomen Creek.

*Mississippi System.—Upper Mississippi Basin.*—Slight flooding occurred along the Illinois River at Morris, Ill., and along the Meramec in Missouri from the heavy rains which averaged slightly over 3 inches in the Illinois Basin and 1.75 inches in the Meramec Basin on the 21st and 22d. No damage resulted.

The Upper Mississippi River at and above Dam 10 remained at near normal pool stage throughout December. The river was officially closed to navigation at LaCrosse, Wisc., on the 14th when it froze over from shore to shore. Upper pools No. 7 and 8 were frozen over with a thin coating of ice as early as the 9th.

*Ohio Basin.*—A general rain beginning on the 10th and continuing through the 14th caused moderate to heavy rises in streams in the basin with the highest crests since 1937 on the Green River in Kentucky. The rainfall over the Green and Barren basins during this period averaged between 6 and 7 inches with one station reporting a total of 9.24 inches. Both streams were overflowing before the rainfall ceased and crested 8 to 13 feet above bankfull stage. Nearly an additional inch of rain

on the 18th and 19th delayed as well as contributed to the crests downstream and slowed down the fall upstream.

Sharp rises occurred in all the southern tributaries of the Ohio River but no flooding occurred except in the Little Kanawha at Glenville, W. Va. A considerable rise followed on the Ohio River. Dam 29 rose from a pool condition at 15 feet to a crest of 36 feet in 3 days, but flood stages were not exceeded anywhere on the Ohio River.

On the 22d and 23d rains averaging over 2 inches covered the upper Wabash. These were followed by additional rain of about an inch over the entire basin on the 26th and 27th. The combined effect of these two storms produced moderate flooding at Wabash, Ind., and at all points from LaFayette, Ind., downstream to Mt. Carmel, Ill. Moderate rises occurred on practically all other tributaries, but no flooding occurred. No serious damage resulted, but some county and low lying State roads in the area from LaFayette, Ind., downstream were inundated for a short period. Rains were much lighter over the East and West Forks of the White but no flooding occurred except at Edwardsport, Ind.

*Lower Mississippi Basin.*—Heavy rains (about 3 inches) near the middle of the month over the St. Francis Basin caused rises to within a few feet of flood stage at Fisk, Mo., and St. Francis, Ark. Additional rain on the 18th, 22d and 26th caused an additional rise at St. Francis, Ark., to above flood stage on the 29th which continued into January.

Heavy rains on the 10th and 12th caused light flooding on the Coldwater River at Sarah, Miss., on the 12th and 13th. Little if any damage occurred as a result of the overflow.

Rains over the Mississippi Valley were sufficient to cause a rise of approximately 20 feet at stations on the Mississippi River during the last half of the month but no flooding occurred.

*West Gulf of Mexico drainage.*—Light flooding occurred on the Sabine River at Bon Weir, Tex., on the 19th and 20th due to heavy rain on the 17th. The river was about 4 feet below bankfull stage before this rain occurred.

The Trinity approached within one foot of bankfull stage at Liberty, Tex., on the 16th from the rain (2 to 3 inches) between the 9th and 15th in the lower Trinity basin.

*Puget Sound and Washington Coast drainage.*—Light overflows occurred along the Chehalis and streams in the Puget Sound drainage from the heavy rain and melting snows during the last week in December. Rains occurred almost daily over western Washington from the 23d to the end of the month with excessive amounts ranging up to 1.5 inches on the 27th and 2.85 inches on the 28th in some basins. The snow line was estimated to be between 500 and 1,000 feet. Snowmelt was a considerable factor. According to State Highway Department reports, the snow depth on Snoqualmie Pass decreased from 80 inches on the 27th to 53 inches on the 28th and on Stevens Pass from 110 inches on the 27th to 90 inches on the 28th. Temperatures in the lower valleys reached 50°–56° from the 27th to the 29th and temperatures were slightly above freezing up to about 4,000 feet during this period. Colder weather and less rain on and after the 29th halted this serious flood threat.

## FLOOD STAGE REPORT FOR DECEMBER 1949

| River and station | Flood stage | Above flood stages—dates | | Crest [1] | |
|---|---|---|---|---|---|
| | | From— | To— | Stage | Date |
| ATLANTIC SLOPE DRAINAGE | | | | | |
| | *Feet* | | | *Feet* | |
| Perkiomen Creek: Graters Ford, Pa | 8 | 27 | 27 | 10.2 | 27 |
| MISSISSIPPI SYSTEM | | | | | |
| *Upper Mississippi Basin* | | | | | |
| Illinois: Morris, Ill | 13 | 23 | 23 | 13.8 | 23 |
| Meramec: | | | | | |
| Sullivan, Mo | 11 | 23 | 23 | 12.0 | 23 |
| Pacific, Mo | 11 | 23 | 24 | 13.5 | 24 |
| *Ohio Basin* | | | | | |
| Little Kanawha: Glenville, W. Va | 23 | 13 | 13 | 23.1 | 13 |
| Barren: Bowling Green, Ky | 28 | 13 | 16 | 36.9 | 14 |
| Rolling Fork: Boston, Ky | | 13 | 17 | 44.5 | 15 |
| Green: | | | | | |
| Mundfordville, Ky | 28 | 13 | 16 | 36.4 | 15 |
| Lock No. 6, Brownsville, Ky | 28 | 12 | 18 | 40.7 | 15 |
| Lock No. 4, Woodbury, Ky | 33 | 12 | 22 | 46.7 | 16 |
| Lock No. 2, Rumsey, Ky | 34 | 15 | 29 | 41.1 | 23 |
| West Fork: Edwardsport, Ind | 12 | 13 | 13 | 12.2 | 13 |
| | | 23 | 30 | 13.8 | 24 |
| Wabash: | | | | | |
| Wabash, Ind | 12 | 22 | 23 | 14.8 | 22 |
| Lafayette, Ind | 11 | 22 | 25 | 17.5 | 23 |
| | | 28 | 29 | | |
| Covington, Ind | 16 | 23 | 30 | 20.6 | 25 |
| Montezuma, Ind | | | | 21.1 | 27 |
| Terre Haute, Ind | 14 | 23 | (2) | 17.8 | 27 |
| Hutsonville, Ill | | | | 20.9 | 29 |
| Vincennes, Ind | 16 | 29 | (2) | 17.5 | 31 |
| *Lower Mississippi Basin* | | | | | |
| Coldwater: Sarah, Miss | 18 | 12 | 13 | 19.2 | 13 |
| St. Francis: St. Francis, Ark | 18 | 29 | (2) | 18.5 | 31 |
| WEST GULF OF MEXICO DRAINAGE | | | | | |
| Sabine: Bon Weir, Tex | 17 | 19 | 20 | 17.3 | 19 |
| PACIFIC SLOPE DRAINAGE | | | | | |
| *Chehalis Basin* | | | | | |
| Satsop: Satsop, Wash | 34 | 28 | 28 | 34.8 | 28 |
| Chehalis: | | | | | |
| Centralia, Wash | 63 | 28 | 29 | 64.7 | 28 |
| Grand Mound, Wash | 14.5 | 29 | 29 | 14.8 | 29 |
| *Puget Sound* | | | | | |
| Snohomish: Snohomish, Wash | 23.6 | 28 | 28 | 26.6 | 28 |
| Snoqualmie: Tolt, Wash | 51.5 | 28 | 28 | 53.7 | 28 |
| Stillaguamish: Arlington, Wash | 16 | 28 | 28 | 17.9 | 28 |

[1] Provisional.
[2] Continued at end of month.

# CLIMATOLOGICAL DATA FOR DECEMBER 1949

## CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see Review, January 1948, p. 15]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

| Section | Temperature | | | | | | | Precipitation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Monthly extremes | | | | | | | Greatest monthly | | Least monthly | |
| | Section average | Departure from the normal | Station | Highest | Date | Station | Lowest | Date | Section average | Departure from the normal | Station | Amount | Station | Amount |
| | °F. | °F. | | °F. | | | °F. | | In. | In. | | In. | | In. |
| Alabama | 49.9 | +2.3 | Brewton, 3 SSE | 82 | 12 | Valley Head | 15 | 16 | 4.01 | −1.27 | Barton | 6.49 | Newton | 1.54 |
| Arizona | 41.1 | −1.2 | Gila Bend | 89 | 5 | Maverick | −29 | 12 | 1.24 | −.06 | Workman Creek | 4.54 | Ehrenberg | .00 |
| Arkansas | 44.9 | +2.1 | Portland | 85 | 12 | Lead Hill | 9 | 14 | 4.77 | +.53 | Beaty Lake | 10.08 | Gilbert | 1.58 |
| California | 43.3 | −2.3 | Indio, U. S. Date Garden. | 94 | 2 | Bridgeport Dam | −17 | 20 | 1.94 | −1.73 | Gasquet R. S. | 9.70 | Lucerne Valley Tanner Ranch. | T |
| Colorado | 27.0 | +1.1 | Edgewater | 76 | 5 | Wagon Wheel Gap | −31 | 12 | .55 | −.34 | Wolf Creek Pass | 5.68 | 7 stations | .00 |
| Florida | 63.6 | +3.6 | 2 stations | 86 | [1] 5 | Jasper, 10E | 25 | 6 | 2.39 | −.40 | Loxahatchee | 10.62 | 2 stations | .03 |
| Georgia | 50.6 | +2.2 | do | 83 | 12 | Blairsville Exp. Sta | 12 | 24 | 2.52 | −1.61 | Flat Top | 10.40 | Valdosta WBAS | .74 |
| Idaho | 26.3 | .0 | Swan Falls | 60 | 29 | 2 stations | −27 | 20 | 1.72 | −.24 | Roland West Portal | 12.48 | Grand View | T |
| Illinois | 35.7 | +4.5 | 2 stations | 73 | 11 | do | −7 | [1] 23 | 4.72 | +2.57 | Washington | 7.88 | Rockford | 1.86 |
| Indiana | 35.8 | +3.5 | do | 70 | [1] 20 | Elwood Water Works | 1 | 15 | 4.21 | +1.47 | Hobart, 1 NE | 6.97 | Winchester Power Plant. | 2.31 |
| Iowa | 27.1 | +2.7 | 6 stations | 68 | [1] 11 | Decorah | −22 | 24 | 1.07 | −.02 | Muscatine | 3.25 | Council Bluffs, 6 NE | .11 |
| Kansas | 34.4 | +1.3 | Lakin | 73 | 5 | Centralia | −8 | 23 | .87 | +.01 | Ft. Scott | 3.69 | 8 stations | T |
| Kentucky | 40.9 | +3.1 | Ashland Dam 29 | 73 | 22 | Farmers | 7 | 16 | 5.70 | +1.90 | Elizabethtown | 11.64 | Hindman Settlement Sch. | 3.21 |
| Louisiana | 55.4 | +2.8 | 2 stations | 85 | [1] 11 | Chatham | 19 | 16 | 5.00 | −.32 | Evans | 9.42 | Oak Ridge | 1.88 |
| Maryland-Delaware | 38.9 | +3.5 | Cheltenham, Md | 77 | 23 | Friendsville, Md | −1 | 16 | 2.28 | −.89 | Clear Spring, Md | 4.33 | Ocean City, Md | .39 |
| Michigan | 27.4 | +2.7 | 5 stations | 63 | [1] 11 | Watersmeet U. S. Forest. | −21 | [1] 24 | 2.80 | +.86 | Coloma, 2 S | 6.32 | L'Anse, 7 NE | .58 |
| Minnesota | 14.7 | −1.1 | Red Wing Dam 3 | 56 | 11 | Warroad | −37 | 24 | 1.02 | +.26 | 2 stations | 1.91 | Little Falls | .25 |
| Mississippi | 51.5 | +3.1 | 5 stations | 83 | [1] 11 | 2 stations | 16 | 16 | 4.23 | −1.02 | Mount Pleasant | 8.15 | Pickens | 1.59 |
| Missouri | 38.1 | +3.8 | Camdenton | 82 | 11 | Tarkio | −12 | 23 | 3.67 | +1.49 | Wappapello Dam | 6.36 | Oregon | .41 |
| Montana | 17.6 | −5.2 | Columbus | 67 | 5 | 2 stations | −34 | [1] 13 | .88 | +.11 | Summit | 8.73 | Ennis | .07 |
| Nebraska | 28.4 | +1.3 | Trenton | 72 | 2 | Bridgeport | −14 | 12 | .29 | −.39 | Springview | 1.20 | 6 station | T |
| Nevada | 31.4 | −1.3 | 2 stations | 79 | [1] 1 | Mala Vista Ranch | −20 | 20 | .48 | −.48 | Mt. Charleston Lodge | 2.45 | Lathrop Wells | .00 |
| New England | 29.5 | +3.2 | East Deering, N. H | 67 | 27 | Campton, N. H | −18 | 10 | 2.51 | −.81 | Shepaug Dam, Conn | 5.94 | Woodstock, Vt | 1.04 |
| New Jersey | 37.1 | +3.5 | 2 stations | 66 | [1] 22 | Layton | −1 | 10 | 2.90 | −0.63 | Long Valley | 5.31 | Cape May | .80 |
| New Mexico | 33.9 | −1.5 | do | 76 | [1] 1 | Galivan | −31 | 22 | .55 | −.20 | Mogollon | 3.01 | 3 stations | .00 |
| New York | 29.8 | +3.1 | Hilton | 71 | 22 | Indian Lake | −19 | 10 | 2.74 | −.21 | Richland | 8.16 | Dansville AP | .70 |
| North Carolina | 45.3 | +2.7 | Goldsboro | 80 | 13 | Mt. Mitchell | 6 | 23 | 2.30 | −1.49 | Highlands | 10.88 | Oxford Exp. Sta | .41 |
| North Dakota | 8.6 | −4.6 | New England | 62 | 2 | Center | −38 | 14 | .65 | +.17 | Jamestown CAA | 1.97 | Reeder, 14N | T |
| Ohio | 35.6 | +3.9 | 2 stations | 70 | 21 | Mansfield, 6 W | −4 | 9 | 2.96 | +.27 | Portsmouth | 5.14 | Vickery, 2NW | 1.11 |
| Oklahoma | 41.6 | +1.5 | Clayton | 80 | 12 | Kenton | −1 | 12 | 1.64 | −.07 | Battiest | 6.48 | Kenton, 5N | .08 |
| Oregon | 33.8 | −.5 | 3 stations | 69 | [1] 4 | Danner | −25 | 20 | 3.57 | −.69 | Valsetz | 20.00 | Rome CAA Airport | .02 |
| Pennsylvania | 33.6 | +2.4 | Johnstown No. 1 | 70 | 23 | Hawley, 1 S Wallen Dam. | −8 | 10 | 3.32 | +.25 | Eagles Mere | 5.66 | Covington | 1.06 |
| South Carolina | 47.9 | +1.1 | Yemassee | 81 | 14 | Walhalla | 17 | 24 | 1.92 | −1.60 | Sassafras Mtn | 7.26 | Walterboro | .82 |
| South Dakota | 19.3 | −2.7 | Pickstown | 68 | 3 | Pollock | −27 | 24 | .65 | +.14 | Spearfish | 2.39 | 2 stations | T |
| Tennessee | 43.7 | +2.9 | 2 stations | 77 | 11 | 3 stations | 10 | 16 | 5.18 | +.65 | Moscow | 9.97 | Limestone TVA | 1.44 |
| Texas | 50.1 | +1.2 | Rio Grande City | 93 | 12 | Dalhart Exp. Station | 1 | 12 | 2.38 | +.06 | Anahuac | 11.23 | Agua Nueva | .00 |
| Utah | 26.2 | −.9 | Zion Natl. Park | 70 | 4 | Woodruff | −25 | 12 | 1.81 | +.71 | Alta | 11.76 | Callao | .00 |
| Virginia | 40.6 | +2.5 | 5 stations | 73 | 12 | Gordonsville | 5 | 17 | 2.18 | −.87 | Olinger | 4.91 | Speedwell | .96 |
| Washington | 32.9 | −1.3 | Forks, 1 E | 64 | 1 | Lacrosse, 3 ESE | −17 | 20 | 5.34 | −.10 | Quinault Ranger Sta. E. | 28.55 | Prosser, 4NE | .05 |
| West Virginia | 37.9 | +3.2 | Williamson | 73 | 22 | Shady Springs | 1 | 16 | 3.82 | +.55 | Clay No. 1 | 7.05 | Brushy Run | 1.29 |
| Wisconsin | 22.6 | +1.9 | 2 stations | 61 | [1] 11 | Hatfield Power Co. Dam. | −31 | 23 | 1.28 | −.01 | Kenosha | 3.75 | Ashland Exp. Farm | .11 |
| Wyoming | 22.1 | .0 | Buffalo | 67 | 1 | 2 stations | −30 | 12 | .71 | −.07 | Snake River | 2.71 | 3 stations | T |
| Alaska | | | | | | | | | | | | | | |
| Hawaii | 69.7 | −.5 | Puunene AP | 89 | 16 | Haleahala RS | 35 | 5 | 7.77 | −.23 | Kukui | 48.00 | Olowalu | .03 |
| Puerto Rico | 73.6 | −1.0 | Coloso (2) | 95 | 27 | Utuado | 50 | 22 | 5.61 | −1.49 | Rio Blanco (1800 ft.) | 14.73 | Aguirre | .86 |

[1] Other dates also

## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR DECEMBER 1949

| District and station | Elevation of instruments: Barometer above sea level [1] | Thermometer above ground | Anemometer above ground | Pressure: Station | Sea level | Departure from normal | Temperature of the air: Averages: Mean maximum | Mean minimum | Mean | Departure from normal | Extremes: Highest | Date | Lowest | Date | Total heating degree days | Mean temperature of the dew-point | Mean relative humidity [6] | Precipitation: Total | Departure from normal | Greatest in 24 hours | Days with 0.01 inch or more | Days with thunderstorms | Total snowfall (unmelted) | Snow, sleet, and ice on ground at end of month | Wind: Average hourly speed | Prevailing direction | Speed of fastest mile: Miles per hour | Direction | Date | Character of day (sunrise to sunset), number of days: Clear | Partly cloudy | Cloudy | Sky cover, tenths (sunrise to sunset) | Possible sunshine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEW ENGLAND | *Ft.* | *Ft.* | *Ft.* | *Mbs.* | *Mbs.* | *Mbs.* | °*F.* | °*F* | °*F* | °*F.* | °*F* | | °*F.* | | | °*F.* | % | *In.* | *In.* | *In.* | | | *In.* | *In.* | m. p. h. | | | | | *0–3* | *4–7* | *8–10* | *0–10* | % |
| Caribou [3] | 628 | 5 | 33 | 996.6 | 1,021.2 | ..... | 27 | 12 | 30.7 | +4.2 | 43 | 23 | −9 | 11 | 1,405 | 12 | 73 / 72 | 2.48 | −1.3 | | | | 10.5 | 1 | 13.6 | w. | 54 | nw. | 30 | 4 | 10 | 17 | 6.1 / 7.3 | .. |
| Eastport | 75 | 67 | 82 | 1,018.6 | 1,021.7 | +7.2 | 38 | 25 | 31.6 | +5.3 | 53 | 13 | 8 | 9 | 1,038 | ..... | ... | 2.75 | −1.0 | .88 | 11 | 0 | 3.2 | 0 | 11.2 | ..... | 39 | nw | 29 | 9 | 6 | 16 | 6.5 | 52 |
| Portland, Me. [3] | 103 | 6 | 43 | 1,019.0 | 1,023.1 | +6.2 | 40 | 20 | 30.0 | +5.0 | 60 | 22 | −8 | 10 | 1,081 | 23 | 76 | 1.75 | −2.2 | .39 | 11 | 0 | 5.3 | 0 | 6.4 | w. | 33 | w. | 28 | 14 | 3 | 14 | 5.2 | 62 |
| Concord [3] | 289 | 5 | 45 | 1,012.9 | 1,024.2 | +7.6 | 39 | 17 | 28.0 | +4.0 | 63 | 22 | −13 | 10 | 1,147 | 20 | 74 | 1.39 | −1.7 | .44 | 12 | 0 | 6.5 | 0 | 4.9 | wnw. | 37 | w. | 29 | 12 | 5 | 14 | 5.7 | 51 |
| Mt. Washington | 6,274 | 5 | 37 | 837.1 | 1,024.7 | ..... | 20 | 4 | 11.8 | +3.2 | 40 | 22 | −20 | 29 | 1,638 | ..... | ... | 3.69 | −3.4 | .92 | 17 | 0 | 7.2 | T | 45.1 | ..... | ... | ..... | ... | 6 | 3 | 22 | 7.5 | 28 |
| Burlington [3] | 403 | 6 | 51 | 1,010.5 | 1,023.7 | +6.1 | 36 | 20 | 28.4 | +4.0 | 57 | 23 | −6 | 10 | 1,139 | 21 | 74 | 1.80 | −.8 | .48 | 13 | 0 | 7.1 | 1 | 11.7 | s. | 52 | s. | 22 | 3 | 11 | 17 | 7.4 | 30 |
| Boston [3] | 124 | 33 | 62 | 1,019.6 | 1,024.6 | +7.7 | 44 | 29 | 36.8 | +4.3 | 64 | 23 | 15 | 30 | 872 | 26 | 65 | 1.64 | −1.8 | .49 | 13 | 0 | 2.4 | 0 | 12.6 | sw. | 37 | nw. | 30 | 12 | 5 | 14 | 5.5 | 59 |
| Nantucket [3] | 12 | 4 | 34 | 1,024.4 | 1,024.7 | +8.1 | 45 | 32 | 38.4 | +2.6 | 55 | 23 | 16 | 10 | 825 | 32 | 76 | 2.59 | −1.2 | .76 | 10 | 0 | T | 0 | 13.0 | nw. | 45 | nw. | 29 | 9 | 4 | 18 | 6.6 | 36 |
| Block Island | 26 | 11 | 46 | 1,023.4 | 1,024.0 | +7.1 | 46 | 33 | 39.4 | +3.4 | 58 | 23 | 20 | 30 | 797 | ..... | ... | 3.54 | −.3 | 1.30 | 13 | 1 | .9 | 0 | 17.7 | ..... | 61 | nw. | 6 | 13 | 6 | 12 | 5.3 | 37 |
| Providence [3] | 159 | 65 | 60 | 1,018.6 | 1,025.0 | +7.4 | 45 | 29 | 37.6 | +6.0 | 62 | 23 | 14 | 10 | 867 | 26 | 70 | 1.86 | −1.5 | .57 | 14 | 0 | 1.3 | 0 | 9.3 | nw. | 42 | nw. | 6 | 14 | 4 | 13 | 5.2 | 45 |
| Hartford [3] | 159 | 5 | 44 | 1,019.0 | 1,025.6 | +7.3 | 42 | 22 | 32.1 | +2.3 | 60 | 27 | 2 | 10 | 1,020 | 25 | 78 | 3.40 | −.6 | .98 | 13 | 0 | 12.6 | 0 | 6.8 | nw. | 35 | nw. | 29 | 13 | 3 | 15 | 5.5 | 54 |
| New Haven [3] | 107 | 5 | 39 | 1,021.0 | 1,025.1 | +6.8 | 43 | 27 | 34.9 | +4.0 | 55 | 28 | 11 | 10 | 933 | ..... | ... | 3.15 | −.6 | .75 | 14 | 0 | 4.8 | 0 | 6.6 | ..... | 26 | w. | 29 | 18 | 3 | 10 | 5.2 | 59 |
| MIDDLE ATLANTIC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Albany [3] | 97 | 6 | 40 | 1,020.7 | 1,024.7 | +6.4 | 39 | 21 | 39.0 | +3.8 | 59 | 22 | −3 | 10 | 1,098 | 23 | 71 / 76 | 2.47 | −.8 | | | | | | | | | | | | | | 5.8 / 6.5 | 38 |
| Binghamton [4] | 871 | 57 | 79 | 992.6 | 1,025.2 | +6.9 | 41 | 24 | 29.7 | +4.2 | 60 | 22 | 3 | 10 | 1,021 | 23 | 75 | 2.65 | −1.0 | .73 | 10 | 0 | 8.6 | 0 | 9.6 | s. | 40 | nw. | 29 | 9 | 8 | 14 | 6.5 | 38 |
| New York [4] | 314 | 415 | 454 | 1,013.9 | 1,025.8 | +7.2 | 47 | 33 | 32.0 | +3.8 | 60 | 22 | 21 | 30 | 767 | 28 | 66 | 2.03 | +.3 | 1.00 | 17 | 0 | 9.5 | 0 | 6.1 | wsw. | 26 | w. | 29 | 4 | 11 | 16 | 7.0 | 45 |
| Allentown [3] | 385 | 4 | 58 | 1,011.5 | 1,026.6 | ..... | 43 | 26 | 40.2 | +5.2 | 62 | 27 | 21 | 30 | 767 | 28 | 66 | 2.03 | −1.6 | .69 | 11 | 0 | .7 | 0 | 12.2 | nw. | 56 | nw. | 29 | 14 | 4 | 13 | 5.4 | 57 |
| Harrisburg [3] | 374 | 30 | 49 | 1,012.2 | 1,026.7 | +6.7 | 43 | 28 | 34.3 | +1.6 | 59 | 22 | 13 | 16 | 952 | 26 | 75 | 3.17 | −.1 | 1.15 | 12 | 0 | 2.7 | 0 | 7.0 | nw. | ..... | ..... | ... | 10 | 8 | 13 | 5.8 | .. |
| Philadelphia [4] | 114 | 174 | 150 | 1,016.6 | 1,026.5 | +6.9 | 47 | 34 | 35.6 | +2.9 | 64 | 22 | 15 | 17 | 913 | 25 | 69 | 2.77 | −.2 | 1.10 | 11 | 0 | 2.5 | 0 | 6.4 | wnw. | 27 | w. | 5 | 9 | 8 | 14 | 6.1 | 57 |
| Reading | 323 | 47 | 306 | 1,013.5 | 1,026.1 | +6.5 | 45 | 31 | 40.8 | +4.5 | 64 | 27 | 24 | 16 | 753 | 30 | 71 | 3.03 | −.4 | .79 | 12 | 0 | .4 | 0 | 9.0 | wnw. | 25 | n. | 3 | 14 | 5 | 12 | 5.2 | 59 |
| Scranton | 805 | 72 | 104 | 995.6 | 1,026.1 | +7.1 | 40 | 26 | 38.0 | +3.8 | 61 | 22 | 18 | 16 | 836 | ..... | ... | 3.72 | +.2 | 1.23 | 10 | 0 | 4.5 | 0 | 10.4 | ..... | 36 | nw. | 27 | 10 | 7 | 14 | 6.1 | 59 |
| Atlantic City | 52 | 37 | 172 | 1,023.7 | 1,025.7 | +6.1 | 47 | 34 | 33.4 | +2.7 | 60 | 22 | 13 | 10 | 976 | ..... | ... | 3.86 | +.8 | 1.29 | 8 | 0 | 4.6 | 0 | 6.0 | ..... | 28 | w. | 29 | 9 | 11 | 11 | 5.7 | 56 |
| Newark [3] | 30 | 5 | 46 | 1,024.4 | 1,025.9 | ..... | 46 | 30 | 40.4 | +4.2 | 57 | 27 | 22 | 16 | 756 | ..... | ... | 2.15 | −1.8 | .49 | 14 | 0 | .0 | 0 | 14.7 | ..... | 38 | w. | 23 | 11 | 6 | 14 | 5.6 | 67 |
| Trenton | 190 | 89 | 107 | 1,018.6 | 1,025.7 | +6.7 | 46 | 31 | 38.3 | +4.9 | 64 | 22 | 19 | 9 | 830 | 28 | 67 | 2.47 | −1.3 | .86 | 12 | 0 | 1.5 | 0 | 10.1 | sw. | 34 | nw. | 29 | 13 | 5 | 13 | 5.4 | .. |
| Baltimore [4] | 123 | 100 | 215 | 1,022.0 | 1,027.0 | +7.4 | 48 | 35 | 38.4 | +4.0 | 63 | 27 | 19 | 16 | 824 | ..... | ... | 2.45 | −.9 | .66 | 13 | 0 | .6 | 0 | 8.6 | ..... | 28 | nw. | 3 | 9 | 9 | 13 | 5.8 | 51 |
| Washington [4] | 112 | 56 | 100 | 1,022.4 | 1,027.0 | +7.0 | 50 | 34 | 41.5 | +4.3 | 66 | 22 | 19 | 16 | 728 | 29 | 68 | 2.25 | −1.1 | .78 | 12 | 0 | T | 0 | 7.7 | nw. | 37 | nw. | 7 | 10 | 9 | 12 | 5.7 | 50 |
| Cape Henry | 18 | 8 | 54 | 1,025.7 | 1,026.4 | +7.8 | 53 | 40 | 42.0 | +4.5 | 67 | 22 | 22 | 17 | 718 | 28 | 77 | 1.72 | −1.6 | .39 | 10 | 0 | T | 0 | 9.4 | nw. | 37 | nw. | 27 | 10 | 7 | 14 | 5.7 | 57 |
| Lynchburg [3] | 686 | 5 | 58 | 991.5 | 1,026.9 | +6.6 | 50 | 32 | 40.6 | +3.3 | 66 | 19 | 16 | 17 | 753 | 29 | 67 | 2.31 | −1.0 | .53 | 12 | 0 | 1.5 | 0 | 7.8 | ssw. | 30 | nw. | 2 | 12 | 6 | 13 | 5.5 | 53 |
| Norfolk [4] | 91 | 80 | 125 | 1,023.7 | 1,027.3 | +7.0 | 55 | 40 | 47.5 | +4.4 | 73 | 12 | 32 | 16 | 545 | 36 | 69 | 2.10 | −1.2 | .99 | 9 | 0 | T | 0 | 11.6 | nne. | 26 | nw. | 2 | 10 | 8 | 13 | 5.8 | 54 |
| Richmond [4] | 144 | 11 | 52 | 1,020.7 | 1,027.2 | +6.9 | 54 | 34 | 43.9 | +4.1 | 72 | 22 | 21 | 17 | 660 | 32 | 71 | 1.84 | −1.4 | .67 | 8 | 0 | T | 0 | 6.2 | ssw. | 28 | w. | 7 | 10 | 9 | 12 | 5.5 | 57 |
| SOUTH ATLANTIC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ashville [4] | 2,253 | 77 | 92 | 950.6 | 1,026.5 | +4.8 | 54 | 33 | 49.4 | +2.9 | 69 | 27 | 17 | 24 | 677 | 32 | 72 / 76 | 1.73 | −1.7 | | | | | | | | | | | | | | 6.0 / 5.8 | 51 |
| Charlotte [4] | 779 | 63 | 86 | 998.6 | 1,027.0 | +6.3 | 53 | 37 | 45.3 | +2.3 | 69 | 12 | 25 | 17 | 613 | 34 | 70 | 1.79 | −2.1 | 1.23 | 10 | 0 | .1 | 0 | 7.0 | nne. | 19 | sw | 23 | 10 | 2 | 19 | 6.4 | 49 |
| Greensboro [3] | 886 | 6 | 56 | 994.2 | 1,027.2 | +6.5 | 52 | 31 | 41.6 | +2.4 | 68 | 22 | 17 | 17 | 725 | 31 | 68 | 1.29 | −2.5 | .88 | 7 | 0 | T | 0 | 9.2 | ne. | 25 | nw. | 2 | 11 | 3 | 17 | 5.9 | 50 |
| Hatteras | 11 | 5 | 47 | 1,025.7 | 1,026.1 | +6.5 | 58 | 46 | 52.0 | +1.9 | 72 | 12 | 36 | 3 | 401 | 45 | 78 | 2.40 | −1.8 | 1.47 | 9 | 0 | .0 | 0 | 13.4 | nnw. | 31 | w | 2 | 11 | 3 | 17 | 5.7 | 46 |
| Raleigh [4] | 376 | 5 | 71 | 1,010.5 | 1,026.7 | +6.0 | 56 | 37 | 46.4 | +3.4 | 73 | 13 | 23 | 16 | 580 | 34 | 69 | 1.37 | −2.2 | 1.04 | 11 | 0 | T | 0 | 6.3 | ne. | 23 | nw. | 5 | 10 | 8 | 13 | 5.6 | 50 |
| Wilmington | 72 | 73 | 107 | 1,025.1 | 1,026.4 | +5.7 | 60 | 41 | 51.0 | +1.9 | 74 | 13 | 30 | 17 | 438 | 42 | ... | 2.04 | −.7 | .85 | 9 | 0 | .0 | 0 | 8.5 | n. | 24 | w. | 23 | 12 | 5 | 14 | 5.5 | 58 |
| Charleston [4] | 48 | 11 | 92 | 1,023.7 | 1,025.6 | +4.9 | 62 | 46 | 53.9 | +2.2 | 76 | 13 | 34 | 16 | 349 | 42 | 73 | .93 | −1.8 | .65 | 6 | 0 | .0 | 0 | 8.0 | ne. | 31 | sw. | 7 | 9 | 8 | 14 | 5.9 | 61 |
| Columbia, S. C. [4] | 347 | 70 | 91 | 1,018.0 | 1,024.9 | +3.9 | 59 | 39 | 49.1 | +1.9 | 76 | 12 | 28 | 24 | 492 | 38 | 73 | 1.31 | −1.7 | .82 | 7 | 0 | .0 | 0 | 6.7 | ne. | 27 | ne. | 28 | 10 | 4 | 17 | 6.1 | 42 |
| Greenville, S. C. [3] | 1,040 | 18 | 36 | 988.2 | 1,026.2 | +6.2 | 52 | 36 | 44.3 | +2.1 | 64 | 22 | 25 | 24 | 643 | 34 | 72 | 2.28 | −2.6 | .77 | 15 | 0 | T | 0 | 7.7 | ne. | 40 | n. | 23 | 9 | 5 | 17 | 6.5 | 45 |
| Augusta [3] | 182 | 62 | 77 | 1,019.3 | 1,026.1 | +5.4 | 60 | 41 | 50.8 | +2.7 | 78 | 12 | 27 | 14 | 446 | 37 | 65 | 1.99 | −1.4 | 1.30 | 8 | 0 | T | 0 | 8.3 | nne. | ..... | ..... | ... | 8 | 5 | 18 | 6.5 | .. |
| Savannah [3] | 65 | 19 | 51 | 1,024.0 | 1,025.6 | +4.9 | 65 | 45 | 54.9 | +4.2 | 78 | 27 | 33 | 16 | 326 | 45 | 74 | 1.80 | −1.1 | .83 | 4 | 0 | .0 | 0 | 12.6 | n. | 28 | ne. | 9 | 8 | 8 | 15 | 6.0 | 66 |
| Jacksonville [4] | 43 | 86 | 110 | 1,023.0 | 1,024.3 | +3.6 | 68 | 52 | 60.2 | +3.9 | 78 | 13 | 36 | 24 | 184 | 51 | 79 | 1.05 | −2.0 | .50 | 5 | 0 | .0 | 0 | 8.9 | nne. | 26 | ne. | 24 | 7 | 5 | 19 | 6.7 | 38 |
| FLORIDA PENINSULA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key West [4] | 21 | 10 | 64 | 1,019.0 | 1,019.5 | +.9 | 77 | 68 | 69.8 | +3.0 | 81 | 25 | 63 | 1 | 0 | 65 | 75 / 80 | 1.96 | .0 | | | | | | | | | | | | | | 5.4 / 4.9 | 61 |
| Miami [4] | 25 | 242 | 249 | 1,019.3 | 1,020.3 | +1.0 | 76 | 66 | 72.7 | +2.4 | 79 | 28 | 55 | 6 | 2 | 61 | 72 | 1.99 | +.3 | 1.11 | 10 | 0 | .0 | 0 | 10.7 | ne. | 25 | e. | 31 | 11 | 10 | 10 | 5.8 | 54 |
| Tampa [3] | 35 | 5 | 36 | 1,021.0 | 1,022.3 | +2.3 | 76 | 56 | 70.8 | +1.7 | 79 | 28 | 55 | 6 | 53 | 55 | 74 | 3.58 | +1.6 | .71 | 16 | 1 | .0 | 0 | 16.7 | e. | 47 | ne. | 31 | 7 | 14 | 10 | 5.4 | 61 |
| EAST GULF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Atlanta [3] | 1,173 | 33 | 72 | 983.1 | 1,025.9 | +5.2 | 54 | 38 | 66.0 | +4.9 | 82 | 11 | 42 | 6 | 600 | 35 | 74 / 73 | 3.65 | −1.4 | | | | | | | | | | | | | | 6.6 / 6.5 | 44 |
| Macon [3] | 370 | 79 | 87 | 1,012.9 | 1,025.5 | +4.8 | 61 | 39 | 53.0 | +3.0 | 78 | 12 | 25 | 24 | 466 | 39 | 70 | 2.80 | −2.0 | .70 | 13 | 0 | .0 | 0 | 9.0 | ene. | 28 | nw. | 23 | 9 | 4 | 18 | 6.5 | 44 |
| Apalachicola | 35 | 11 | 51 | 1,022.0 | 1,023.4 | +3.1 | 65 | 52 | 50.0 | ..... | 78 | 12 | 25 | 24 | 209 | ..... | ... | 2.80 | ..... | 1.08 | 7 | 0 | .0 | 0 | 8.6 | ne. | 26 | s. | 22 | 9 | 3 | 19 | 6.7 | 51 |
| Pensacola [4] | 56 | 54 | 79 | 1,021.3 | 1,023.7 | +3.0 | 66 | 50 | 58.5 | +2.8 | 76 | 19 | 34 | 24 | 209 | ..... | ... | .99 | −4.1 | .58 | 4 | 0 | .0 | 0 | 9.6 | ne. | 27 | n. | 15 | 10 | 8 | 13 | 6.0 | 50 |
| Anniston | 618 | 6 | 32 | 1,002.7 | 1,025.5 | ..... | 58 | 35 | 58.0 | +4.0 | 75 | 13 | 33 | 23 | 227 | 48 | ... | 3.88 | −.8 | 1.40 | 10 | 2 | .0 | 0 | 8.9 | ne. | 27 | nw. | 22 | 6 | 6 | 19 | 7.0 | 49 |
| Birmingham [3] | 700 | 5 | 63 | 1,002.0 | 1,025.3 | +4.0 | 58 | 36 | 46.6 | +1.4 | 72 | 12 | 21 | 16 | 575 | 38 | 75 | 2.46 | −2.6 | .59 | 6 | 0 | T | 0 | 8.7 | ene. | ..... | ..... | ... | 9 | 8 | 14 | 6.5 | .. |
| Mobile [4] | 57 | 86 | 161 | 1,015.2 | 1,023.6 | +2.9 | 66 | 48 | 47.4 | +3.3 | 70 | 20 | 20 | 16 | 548 | 37 | 72 | 3.44 | −1.7 | .83 | 15 | 0 | T | 0 | 9.3 | n. | 38 | se. | 25 | 8 | 7 | 16 | 6.5 | 40 |
| Montgomery [4] | 218 | 92 | 105 | 1,017.3 | 1,025.0 | +3.7 | 61 | 43 | 57.1 | +4.9 | 76 | 27 | 30 | 23 | 258 | 47 | 76 | 4.82 | −.2 | 2.35 | 10 | 0 | .0 | 0 | 11.1 | nne. | 38 | nw. | 22 | 6 | 11 | 14 | 6.4 | 41 |
| Meridian [4] | 375 | 67 | 92 | 1,010.8 | 1,024.5 | +3.5 | 63 | 38 | 51.8 | +2.4 | 77 | 12 | 29 | 24 | 418 | 40 | 73 | 3.41 | −1.4 | 1.39 | 9 | 0 | .0 | 0 | 7.5 | ene. | 22 | s. | 22 | 8 | 5 | 18 | 6.5 | 43 |
| Vicksburg [4] | 247 | 82 | 102 | 1,014.2 | 1,023.4 | +2.4 | 62 | 42 | 50.4 | +2.7 | 80 | 11 | 23 | 24 | 462 | 41 | 75 | 5.53 | +.3 | 1.14 | 13 | 2 | T | 0 | 6.7 | ssw. | ..... | ..... | ... | 8 | 5 | 18 | 6.4 | .. |
| New Orleans C. O. | 53 | 76 | 84 | 1,020.7 | ..... | ..... | 66 | 52 | 53.2 | +3.2 | 80 | 11 | 29 | 16 | 376 | 41 | ... | 2.96 | −2.4 | 1.01 | 11 | 1 | T | 0 | 9.3 | ese. | 28 | s. | 21 | 6 | 10 | 15 | 6.7 | 50 |
| New Orleans A. P. [3] | 30 | 6 | 52 | 1,020.7 | 1,022.7 | +2.0 | 67 | 50 | 59.0 | ..... | 82 | 12 | 36 | 16 | 225 | 51 | 77 | 5.33 | +.5 | 2.23 | 11 | 1 | .0 | 0 | 7.9 | ..... | 18 | ne. | 14 | 5 | 11 | 15 | 6.6 | 46 |
| WEST GULF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shreveport [3] | 181 | 5 | 64 | 1,013.2 | 1,022.4 | +1.7 | 62 | 41 | 55.1 | +3.4 | 79 | 11 | 25 | 23 | 428 | 44 | 77 | 4.08 | +.9 | | | | | | | | | | | | | | 7.1 | .. |
| Fort Smith [3] | 463 | 6 | 30 | 1,005.4 | 1,022.7 | +2.7 | 55 | 32 | 51.2 | +1.9 | 77 | 11 | 18 | 15 | 658 | 33 | 78 / 70 | 5.20 | +.9 | 3.12 | 17 | 3 | T | 0 | 9.9 | sse. | 29 | se. | 10 | 8 | 4 | 19 | 6.5 | 45 |
| Little Rock [3] | 265 | 26 | 58 | 1,010.2 | 1,023.7 | +3.0 | 56 | 36 | 43.8 | +1.7 | 77 | 11 | 22 | 16 | 594 | 38 | 74 | 2.55 | −.2 | .76 | 11 | 1 | T | 0 | 7.0 | ne. | 45 | sw. | 11 | 9 | 7 | 15 | 6.3 | 47 |
| Austin [3] | 621 | 5 | 41 | 999.7 | 1,021.4 | +.4 | 63 | 45 | 45.9 | +1.7 | 76 | 11 | 22 | 23 | 348 | 46 | 77 | 4.78 | +.6 | 1.51 | 14 | 2 | T | 0 | 7.4 | se. | 30 | s. | 11 | 10 | 2 | 19 | 6.5 | 39 |
| Brownsville [3] | 20 | 5 | 54 | 1,017.3 | 1,017.7 | −.6 | 74 | 59 | 54.2 | +3.2 | 81 | 11 | 24 | 23 | 83 | 61 | 83 | 4.04 | −1.4 | 1.24 | 15 | 2 | T | 0 | 8.4 | ne. | 32 | ne. | 12 | 6 | 7 | 18 | 6.9 | 34 |
| Corpus Christi [3] | 44 | 6 | 33 | 1,019.0 | 1,019.6 | .0 | 71 | 57 | 66.7 | +5.5 | 84 | 1 | 39 | 23 | 83 | 61 | 83 | 2.14 | +.3 | .68 | 11 | 0 | .0 | 0 | 11.5 | sse. | 36 | s. | 21 | 3 | 8 | 20 | 7.8 | 24 |
| Dallas [3] | 488 | 34 | 45 | 1,003.4 | 1,021.3 | +1.0 | 60 | 40 | 64.0 | +7.5 | 84 | 11 | 38 | 16 | 124 | 58 | 84 | 1.77 | +.3 | 1.35 | 7 | 1 | .0 | 0 | 10.6 | nne. | 45 | s. | 20 | 4 | 4 | 23 | 7.9 | 34 |
| Fort Worth [3] | 706 | 40 | 56 | 996.6 | 1,021.6 | +1.6 | 60 | 40 | 50.4 | +2.7 | 78 | 11 | 27 | 15 | 459 | 38 | 67 | 1.38 | −1.0 | .30 | 11 | 0 | T | 0 | 9.0 | sse. | 47 | se. | 21 | 8 | 7 | 16 | 6.4 | 45 |
| Galveston [4] | 54 | 122 | 129 | 1,020.7 | 1,020.9 | +.6 | 64 | 55 | 49.8 | +3.3 | 77 | 6 | 27 | 15 | 472 | 37 | 66 | 1.04 | −.8 | .38 | 11 | 0 | T | 0 | 12.8 | sse. | 43 | s. | 21 | 9 | 6 | 16 | 6.0 | .. |
| Houston [4] | 138 | 157 | 190 | 1,018.6 | 1,021.3 | +1.0 | 66 | 51 | 59.6 | +3.2 | 73 | 6 | 37 | 15 | 190 | 55 | 85 | 7.86 | +4.1 | 3.87 | 13 | 3 | T | 0 | 11.6 | nne. | 43 | s. | 10 | 7 | 2 | 22 | 7.5 | 28 |
| Laredo [3] | 418 | 10 | 38 | 1,004.1 | 1,018.7 | ..... | 69 | 53 | 58.2 | +3.8 | 79 | 7 | 34 | 23 | 239 | 52 | 83 | 9.62 | +5.4 | 2.50 | 15 | 4 | T | 0 | 9.4 | nne. | 28 | nw. | 3 | 5 | 4 | 22 | 7.6 | 33 |
| Palestine | 510 | 64 | 72 | 1,003.1 | ..... | ..... | 62 | 44 | 61.2 | +4.6 | 85 | 20 | 35 | 23 | 171 | 52 | 76 | 1.27 | .0 | .39 | 12 | 1 | .0 | 0 | 9.2 | ne. | ..... | ..... | ... | 4 | 4 | 23 | 8.0 | .. |
| Port Arthur [4] | 34 | 59 | 134 | 1,020.3 | 1,021.0 | +1.0 | 64 | 51 | 57.4 | +2.7 | 74 | 21 | 33 | 23 | 246 | 51 | 84 | 3.47 | −.2 | 1.00 | 13 | 2 | .0 | 0 | 8.3 | ne. | 25 | s. | 21 | 6 | 10 | 15 | 6.9 | 40 |
| San Antonio [3] | 794 | 6 | 51 | 995.6 | 1,020.3 | +.7 | 64 | 47 | 55.8 | +2.1 | 81 | 11 | 25 | 23 | 296 | 48 | 77 | 2.79 | +1.2 | .84 | 17 | 0 | .0 | 0 | 10.1 | ne. | 38 | ne. | 12 | 6 | 4 | 21 | 7.4 | 31 |

See footnotes at end of table.

## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR DECEMBER 1949—Continued

| District and station | Elevation of instruments: Barometer above sea level [1] | Elevation of instruments: Thermometer above ground | Elevation of instruments: Anemometer above ground | Pressure: Station | Pressure: Sea level | Pressure: Departure from normal | Temperature of the air: Averages: Mean maximum | Temperature of the air: Averages: Mean minimum | Temperature of the air: Averages: Mean | Temperature of the air: Averages: Departure from normal | Temperature of the air: Extremes: Highest | Temperature of the air: Extremes: Date | Temperature of the air: Extremes: Lowest | Temperature of the air: Extremes: Date | Total heating degree days | Mean temperature of the dew-point | Mean relative humidity [6] | Precipitation: Total | Precipitation: Departure from normal | Precipitation: Greatest in 24 hours | Precipitation: Days with 0.01 inch or more | Precipitation: Days with thunderstorms | Precipitation: Total snowfall (unmelted) | Precipitation: Snow, sleet, and ice on ground at end of month | Wind: Average hourly speed | Wind: Prevailing direction | Wind: Speed of fastest mile: Miles per hour | Wind: Speed of fastest mile: Direction | Wind: Speed of fastest mile: Date | Character of day (sunrise to sunset), number of days: Clear | Character of day (sunrise to sunset), number of days: Partly cloudy | Character of day (sunrise to sunset), number of days: Cloudy | Sky cover, tenths (sunrise to sunset): 0-10 | Possible sunshine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ft. | Ft. | Ft. | Mbs. | Mbs. | Mbs. | °F. | °F. | °F. | °F. | °F. | | °F. | | | °F. | % | In. | In. | In. | | | In. | In. | m.p.h. | | m.p.h. | | | 0-3 | 4-7 | 8-10 | | % |
| OHIO VALLEY AND TENNESSEE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 39.7 | +4.1 | | | | | | | 72 | 4.35 | +.8 | | | | | | | | | | | | | | | 6.3 | | |
| Chattanooga [2] | 762 | 6 | 66 | 1,000.4 | 1,025.9 | +4.6 | 53 | 33 | 43.3 | +2.4 | 66 | 12 | 21 | 16 | 673 | 34 | 73 | 4.37 | −.8 | .96 | 14 | 0 | T | 0 | 5.3 | s. | 27 | s. | 22 | 10 | 7 | 14 | 6.1 | 45 |
| Knoxville [2] | 995 | 27 | 71 | 990.2 | 1,026.0 | +5.0 | 53 | 33 | 43.1 | +4.1 | 69 | 12 | 20 | 24 | 680 | 34 | 73 | 4.37 | −.8 | .96 | 14 | 0 | T | 0 | 5.3 | s. | 27 | s. | 22 | 10 | 7 | 14 | 6.1 | 45 |
| Memphis [2] | 399 | 5 | 49 | 1,013.5 | 1,024.2 | +3.2 | 57 | 36 | 46.4 | +4.0 | 77 | 11 | 21 | 16 | 581 | 36 | 70 | 7.06 | +2.6 | 3.29 | 12 | 1 | T | 0 | 7.2 | ne. | 37 | sw. | 6 | 11 | 4 | 16 | 5.8 | 45 |
| Nashville [2] | 546 | 5 | 72 | 1,002.7 | 1,025.1 | +3.8 | 54 | 32 | 43.4 | +2.4 | 69 | 20 | 15 | 16 | 670 | 34 | 73 | 5.68 | +1.5 | 2.47 | 11 | 2 | T | 0 | 9.8 | sse. | 30 | s. | 11 | 9 | 5 | 17 | 6.3 | 47 |
| Lexington [2] | 989 | 4 | 58 | 988.5 | 1,025.5 | +4.8 | 50 | 30 | 40.0 | +4.2 | 67 | 21 | 15 | 15 | 775 | 30 | 70 | 7.26 | +3.5 | 2.97 | 13 | 0 | .4 | 0 | 8.1 | s. | 36 | s. | 22 | 8 | 7 | 16 | 6.4 | 41 |
| Louisville [2] | 525 | 5 | 54 | 1,007.1 | 1,024.8 | +3.8 | 52 | 31 | 41.5 | +5.2 | 70 | 20 | 14 | 16 | 729 | 31 | 68 | 4.84 | +1.1 | 1.79 | 13 | 0 | 1.4 | 0 | 11.8 | sse. | 58 | se. | 12 | 11 | 4 | 16 | 5.9 | -- |
| Evansville [2] | 431 | 6 | 40 | 1,008.5 | 1,024.8 | +3.8 | 50 | 30 | 40.3 | +5.5 | 68 | 21 | 15 | 16 | 764 | 31 | 73 | 4.28 | +.7 | 1.43 | 10 | 1 | .3 | 0 | 8.4 | sse. | 58 | se. | 12 | 11 | 3 | 17 | 6.1 | 51 |
| Indianapolis [2] | 823 | 5 | 54 | 993.2 | 1,023.7 | +3.7 | 45 | 27 | 35.8 | +4.9 | 66 | 20 | 10 | 15 | 903 | 27 | 74 | 4.32 | +1.3 | 1.06 | 14 | 2 | .6 | 0 | 8.7 | sse. | 34 | s. | 11 | 8 | 6 | 17 | 6.6 | 49 |
| Terre Haute [2] | 575 | 4 | 36 | 1,002.0 | 1,024.0 | +4.0 | 46 | 28 | 36.6 | +4.1 | 66 | 20 | 9 | 15 | 877 | 28 | 73 | 4.22 | +1.3 | 1.17 | 14 | 0 | 1.4 | 0 | 11.0 | se. | 44 | nw. | 1 | 10 | 5 | 16 | 6.0 | 56 |
| Cincinnati [4] | 627 | 135 | 148 | 1,001.0 | 1,024.7 | +4.0 | 50 | 32 | 41.1 | +4.7 | 69 | 20 | 15 | 15 | 743 | 29 | 70 | 3.46 | +.5 | .91 | 11 | 0 | .8 | 0 | 11.1 | sse. | 40 | s. | 11 | 10 | 4 | 17 | 6.3 | 54 |
| Columbus [4] | 822 | 90 | 110 | 993.6 | 1,024.8 | +4.8 | 45 | 29 | 37.1 | +4.7 | 64 | 12 | 13 | 15 | 867 | 28 | 74 | 2.37 | −.4 | .88 | 15 | 0 | .3 | 0 | 10.3 | ssw. | 21 | nw. | 2 | 9 | 4 | 18 | 6.4 | 44 |
| Dayton [2] | 1,003 | 6 | 55 | 986.8 | 1,024.4 | +4.8 | 44 | 26 | 35.0 | +3.7 | 61 | 12 | 7 | 15 | 926 | 28 | 74 | 3.10 | +.4 | 1.06 | 14 | 1 | 1.1 | 0 | 9.1 | se. | 37 | s. | 21 | 7 | 7 | 17 | 6.7 | 45 |
| Elkins [2] | 1,947 | 5 | 45 | 952.3 | 1,026.7 | +5.7 | 48 | 24 | 36.2 | +4.5 | 69 | 21 | 6 | 16 | 892 | 28 | 76 | 3.63 | +.2 | .69 | 15 | 1 | 3.1 | 0 | 11.7 | s. | 43 | w. | 27 | 8 | 7 | 16 | 6.5 | 45 |
| Parkersburg | 637 | 77 | 84 | | | | 49 | 29 | 39.0 | +3.8 | 68 | 21 | 12 | 16 | 807 | | | 4.13 | +1.1 | 2.26 | 13 | 0 | .6 | 0 | 6.7 | | 24 | sw. | 22 | 9 | 5 | 17 | 6.3 | 48 |
| Pittsburgh [2] | 842 | 39 | 54 | 993.2 | 1,024.9 | +5.3 | 44 | 28 | 36.0 | +4.0 | 67 | 22 | 11 | 16 | 890 | 27 | 69 | 3.43 | +.6 | 1.32 | 14 | 0 | .8 | 0 | 10.5 | s. | 34 | w. | 27 | 8 | 6 | 17 | 6.8 | 41 |
| LOWER LAKES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 32.8 | +4.3 | | | | | | | 73 | 3.03 | +.3 | | | | | | | | | | | | | | | 7.4 | | |
| Buffalo [2] | 768 | 34 | 96 | 994.2 | 1,023.5 | +5.9 | 41 | 26 | 33.3 | +4.5 | 64 | 22 | 12 | 15 | 983 | 25 | 72 | 3.68 | +.3 | 1.00 | 19 | 0 | 9.5 | 0 | 14.9 | w. | 47 | sw. | 27 | 1 | 11 | 19 | 7.6 | 35 |
| Canton | 448 | 10 | 61 | 1,005.8 | 1,022.4 | +5.1 | 35 | 18 | 26.8 | +5.0 | 62 | 22 | −8 | 30 | 1,185 | | | 2.57 | −.1 | .51 | 14 | 0 | 11.7 | 4 | 8.8 | | 36 | w. | 28 | 7 | 4 | 20 | 7.1 | 41 |
| Oswego | 335 | 71 | 85 | 1,010.5 | 1,023.7 | +5.7 | 38 | 26 | 32.1 | +4.0 | 65 | 22 | 11 | 10 | 1,020 | | | 4.53 | +1.0 | .97 | 20 | 5 | 25.3 | 0 | 11.6 | | 32 | nw. | 6 | 3 | 7 | 21 | 7.9 | 25 |
| Rochester [2] | 523 | 4 | 69 | 1,003.7 | 1,023.8 | +5.5 | 40 | 24 | 31.8 | +3.2 | 69 | 22 | 5 | 10 | 1,026 | 24 | 76 | 1.95 | −.8 | .45 | 16 | 1 | 9.4 | 0 | 12.1 | wsw. | 56 | w. | 27 | 2 | 14 | 15 | 7.1 | 37 |
| Syracuse [2] | 596 | 5 | 57 | 1,001.4 | 1,024.4 | +6.4 | 40 | 24 | 31.6 | +4.2 | 66 | 22 | 3 | 10 | 1,038 | 23 | 71 | 2.32 | −.8 | .68 | 18 | 2 | 8.9 | 0 | 11.1 | w. | 61 | w. | 29 | 5 | 7 | 19 | 7.1 | 37 |
| Erie | 714 | 57 | 81 | | | | 42 | 30 | 35.8 | +3.9 | 63 | 22 | 19 | 16 | 900 | | | 2.94 | +.1 | .81 | 19 | 0 | 10.6 | 0 | 10.3 | | 35 | sw. | 7 | 2 | 8 | 21 | 7.8 | 29 |
| Cleveland [2] | 762 | 27 | 54 | 994.6 | 1,023.4 | +4.8 | 42 | 26 | 34.2 | +5.1 | 64 | 22 | 9 | 16 | 956 | 28 | 76 | 3.30 | +.9 | .71 | 18 | 0 | 7.6 | 0 | 13.4 | s. | 49 | w. | 7 | 2 | 8 | 21 | 7.4 | 38 |
| Sandusky | 629 | 5 | 67 | 999.7 | | | 43 | 28 | 35.4 | +4.2 | 63 | 12 | 14 | 16 | 919 | | | 2.11 | −.2 | .61 | 13 | 0 | 1.2 | 0 | 10.0 | | 32 | sw. | 27 | 3 | 12 | 16 | 7.4 | 38 |
| Toledo [2] | 628 | 5 | 47 | 999.0 | 1,023.3 | +4.0 | 42 | 25 | 33.2 | +4.1 | 63 | 12 | 10 | 15 | 987 | 26 | 76 | 2.73 | +.4 | .68 | 15 | 1 | 4.1 | 0 | 12.5 | wsw. | 38 | sw. | 12 | 5 | 6 | 20 | 7.5 | 39 |
| Fort Wayne [2] | 857 | 5 | 34 | 990.5 | 1,023.2 | +3.9 | 41 | 25 | 33.2 | +4.6 | 63 | 11 | 8 | 15 | 983 | 26 | 78 | 3.70 | +1.1 | 1.02 | 15 | 1 | .7 | 0 | 9.4 | s. | 38 | s. | 21 | 6 | 7 | 18 | 6.8 | 50 |
| Detroit [2] | 730 | 5 | 77 | 995.3 | 1,023.1 | +4.5 | 39 | 27 | 33.0 | +4.1 | 61 | 12 | 13 | 15 | 993 | 25 | 73 | 3.51 | +1.2 | .84 | 18 | 1 | 4.7 | 0 | 11.9 | wnw. | 37 | sw. | 22 | 7 | 4 | 20 | 7.4 | 34 |
| UPPER LAKES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 26.2 | +2.8 | | | | | | | 77 | 2.68 | +.7 | | | | | | | | | | | | | | | 7.5 | | |
| Alpena | 609 | 5 | 89 | 997.3 | | | 34 | 22 | 27.9 | +3.1 | 52 | 12 | 9 | 8 | 1,142 | | | 1.78 | −.3 | .39 | 18 | 1 | 8.2 | T | 11.2 | | 35 | se. | 25 | 0 | 7 | 24 | 8.7 | 19 |
| Escanaba | 612 | 51 | 72 | 996.3 | | | 32 | 18 | 25.0 | +2.6 | 50 | 11 | −3 | 24 | 1,244 | | | .89 | −.9 | .49 | 11 | 0 | 4.7 | T | 11.0 | | 35 | sw. | 12 | 6 | 8 | 17 | 6.7 | 48 |
| Grand Rapids [4] | 707 | 70 | 244 | 994.9 | 1,021.3 | +3.0 | 39 | 27 | 32.8 | +4.3 | 62 | 11 | 14 | 15 | 994 | 25 | 80 | 4.21 | +1.6 | 1.50 | 21 | 0 | 11.5 | 0 | 13.1 | w. | 66 | sw. | 11 | 1 | 11 | 19 | 7.9 | 29 |
| Lansing [4] | 878 | 5 | 90 | 988.5 | 1,022.2 | +4.2 | 38 | 24 | 31.1 | +4.2 | 62 | 11 | 12 | 15 | 1,052 | 24 | 78 | 4.70 | +2.6 | 1.57 | 18 | 0 | 4.2 | 0 | 16.6 | wsw. | 33 | se. | 25 | 6 | 5 | 20 | 7.5 | 30 |
| Marquette | 734 | 44 | 73 | 990.5 | | | 30 | 18 | 24.1 | +1.5 | 51 | 11 | 0 | 24 | 1,268 | | | 1.21 | −1.4 | .35 | 11 | 0 | 20.0 | T | 9.6 | | 42 | sw. | 12 | 3 | 7 | 21 | 8.0 | 30 |
| Sault Sainte Marie [2] | 614 | 10 | 52 | 992.2 | 1,019.7 | +2.8 | 29 | 16 | 22.2 | +3.4 | 47 | 12 | 2 | 6 | 1,329 | 18 | 80 | 2.69 | +.5 | .40 | 17 | 0 | 31.4 | 3 | 9.6 | se. | 52 | sw. | 12 | 2 | 3 | 26 | 8.7 | 30 |
| Chicago [2] | 673 | 5 | 38 | 998.0 | 1,021.8 | +2.8 | 39 | 24 | 31.8 | +4.9 | 61 | 11 | 4 | 23 | 1,032 | 24 | 75 | 6.67 | +4.6 | 2.38 | 15 | 2 | 5.3 | 0 | 10.8 | sse. | 30 | w. | 11 | 7 | 7 | 17 | 6.8 | 47 |
| Green Bay | 617 | 5 | 32 | 996.3 | 1,020.2 | +2.2 | 32 | 16 | 23.6 | +1.3 | 57 | 11 | −9 | 9 | 1,279 | 14 | 70 | 1.17 | −.5 | .36 | 9 | 0 | 8.6 | T | 11.2 | w. | 61 | sw. | 11 | 8 | 6 | 17 | 6.8 | 50 |
| Milwaukee [2] | 681 | 33 | 66 | 994.2 | 1,020.8 | +2.5 | 36 | 22 | 28.6 | +3.9 | 60 | 11 | 1 | 23 | 1,126 | 22 | 76 | 2.27 | +.6 | .47 | 16 | 0 | 6.2 | 0 | 13.7 | wnw. | 50 | sw. | 12 | 7 | 3 | 21 | 7.3 | 33 |
| Duluth [4] | 1,133 | 5 | 47 | 964.4 | 1,018.8 | +.8 | 24 | 6 | 14.5 | −1.4 | 46 | 11 | −14 | 24 | 1,566 | 8 | 77 | 1.17 | .0 | 1.06 | 7 | 0 | 2.4 | T | 18.6 | wnw. | 39 | nw. | 5 | 9 | 2 | 20 | 7.0 | 37 |
| NORTH DAKOTA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 8.6 | −3.3 | | | | | | | 76 | .87 | +.2 | | | | | | | | | | | | | | | 6.6 | | |
| Fargo [2] | 940 | 5 | 47 | 982.4 | 1,019.1 | −.5 | 21 | 1 | 10.8 | −.7 | 40 | 3 | −18 | 14 | 1,691 | 6 | 79 | 1.31 | +.6 | .70 | 9 | 0 | 10.8 | 5 | 13.2 | nnw. | 36 | s. | 30 | 6 | 9 | 16 | 6.4 | 43 |
| Bismarck [2] | 1,677 | 5 | 41 | 955.6 | 1,019.0 | −1.0 | 20 | −1 | 9.8 | −3.0 | 60 | 2 | −25 | 14 | 1,711 | 3 | 74 | .52 | −.1 | .29 | 7 | 0 | 6.8 | 4 | 10.6 | nw. | 40 | nw. | 11 | 8 | 6 | 17 | 6.5 | 57 |
| Devils Lake | 1,478 | 11 | 44 | 962.1 | | | 13 | −3 | 5.2 | −4.3 | 44 | 2 | −21 | 14 | 1,855 | | | 1.04 | +.5 | .49 | 8 | 0 | 20.1 | 13 | 9.4 | | 31 | n. | 11 | 8 | 8 | 15 | 6.5 | 55 |
| Williston | 1,878 | 42 | 50 | 947.2 | | | 19 | −2 | 8.6 | −5.2 | 54 | 2 | −18 | 23 | 1,750 | | | .60 | .0 | .31 | 9 | 0 | 6.3 | 3 | 6.7 | | 31 | e. | 24 | 7 | 4 | 20 | 6.9 | 52 |
| UPPER MISSISSIPPI | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 30.3 | +3.9 | | | | | | | 74 | 2.74 | +1.0 | | | | | | | | | | | | | | | 6.5 | | |
| Minneapolis-St. Paul [2] | 919 | 43 | 74 | 984.1 | 1,019.4 | +1.1 | 29 | 12 | 20.4 | +.8 | 54 | 11 | −4 | 14 | 1,384 | 14 | 75 | .99 | .0 | .32 | 10 | 0 | 6.5 | 0 | 12.1 | se. | 39 | w. | 11 | 5 | 9 | 17 | 6.9 | 33 |
| La Crosse [2] | 672 | 5 | 29 | 994.2 | 1,020.1 | +1.1 | 32 | 12 | 21.7 | +1.3 | 56 | 11 | −21 | 24 | 1,344 | 16 | 74 | 1.11 | −.2 | .32 | 13 | 0 | 7.5 | T | 9.7 | sse. | 52 | sw. | 11 | 8 | 3 | 20 | 7.1 | 42 |
| Madison [2] | 974 | 27 | 39 | 987.8 | 1,020.8 | +1.5 | 34 | 17 | 25.4 | +3.0 | 59 | 11 | −8 | 24 | 1,225 | 18 | 74 | 1.70 | +.1 | .71 | 12 | 1 | 6.9 | 0 | 13.2 | s. | 65 | sw. | 11 | 8 | 2 | 21 | 7.0 | 44 |
| Charles City | 1,015 | 10 | 51 | 982.1 | 1,020.7 | +1.1 | 32 | 14 | 23.5 | +3.1 | 56 | 11 | −10 | 24 | 1,286 | | | 1.36 | +.1 | .54 | 10 | 0 | 10.4 | 0 | 7.3 | | 37 | sw. | 11 | 9 | 7 | 15 | 6.2 | 43 |
| Moline [2] | 606 | 6 | 50 | 998.3 | 1,021.8 | +1.8 | 40 | 22 | 31.0 | +5.3 | 67 | 11 | 3 | 23 | 1,055 | 22 | 72 | 2.91 | +1.4 | 1.00 | 9 | 2 | 2.3 | 0 | 11.2 | wnw. | 42 | sw. | 11 | 11 | 2 | 18 | 6.2 | 46 |
| Des Moines [4] | 860 | 5 | 99 | 987.8 | 1,020.4 | +.8 | 39 | 19 | 29.0 | +3.0 | 62 | 11 | 0 | 23 | 1,118 | 20 | 74 | .82 | −.4 | .57 | 7 | 1 | 2.3 | 0 | 10.4 | s. | 58 | sw. | 11 | 8 | 8 | 15 | 6.5 | 57 |
| Dubuque | 699 | 60 | 79 | 994.2 | 1,021.0 | +1.4 | 36 | 20 | 28.0 | +3.3 | 62 | 11 | −1 | 23 | 1,150 | 21 | 75 | 1.41 | .0 | .40 | 8 | 1 | 8.1 | 0 | 6.0 | | 17 | sw. | 11 | 9 | 3 | 19 | 6.6 | 46 |
| Burlington [2] | 702 | 4 | 36 | 994.9 | 1,021.7 | +1.7 | 41 | 22 | 31.4 | +4.1 | 67 | 11 | 5 | 23 | 1,041 | 24 | 78 | 2.18 | +.6 | 1.12 | 8 | 2 | .6 | 0 | 11.5 | sse. | 47 | sw. | 11 | 9 | 7 | 17 | 6.6 | 50 |
| Cairo | 357 | 5 | 99 | 1,010.5 | | | 52 | 36 | 43.5 | +5.7 | 71 | 11 | 20 | 15 | 663 | | | 5.54 | +2.1 | 1.89 | 12 | 1 | T | 0 | 9.2 | | 34 | s. | 21 | 9 | 5 | 17 | 6.6 | 44 |
| Peoria [2] | 609 | 7 | 26 | 999.0 | 1,022.0 | +2.0 | 42 | 25 | 33.3 | +5.2 | 64 | 11 | 7 | 23 | 984 | 25 | 75 | 6.34 | +4.6 | 3.38 | 12 | 2 | 3.6 | 0 | 12.1 | s. | 40 | w. | 4 | 9 | 4 | 18 | 6.4 | 44 |
| Springfield, Ill. [4] | 636 | 5 | 49 | 999.3 | 1,022.4 | +2.4 | 44 | 27 | 35.3 | +5.6 | 67 | 11 | 8 | 15 | 918 | 28 | 75 | 4.74 | +2.6 | 2.40 | 13 | 2 | .4 | 0 | 13.0 | s. | 43 | sw. | 11 | 9 | 4 | 18 | 6.5 | 42 |
| St. Louis [4] | 568 | 33 | 59 | 1,001.7 | 1,022.4 | +2.1 | 49 | 33 | 41.0 | +6.1 | 72 | 11 | 18 | 15 | 741 | 28 | 72 | 3.81 | +1.6 | 1.63 | 10 | 2 | .3 | 0 | 9.8 | s. | 40 | sw. | 11 | 10 | 6 | 15 | 6.0 | 55 |
| MISSOURI VALLEY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 30.8 | +2.9 | | | | | | | 72 | 1.47 | +.4 | | | | | | | | | | | | | | | 5.8 | | |
| Columbia, Mo. [4] | 784 | 6 | 66 | 992.2 | 1,021.4 | +1.4 | 47 | 28 | 37.9 | +3.9 | 74 | 11 | 12 | 23 | 839 | 27 | 75 | 3.55 | +1.7 | 2.22 | 10 | 3 | .6 | 0 | 8.0 | sse. | 29 | sw. | 11 | 8 | 7 | 16 | 6.1 | 54 |
| Kansas City [2] | 963 | 38 | 76 | 992.6 | 1,020.8 | +.5 | 47 | 27 | 37.1 | +4.6 | 68 | 11 | 12 | 23 | 866 | 24 | 66 | 1.95 | +.8 | 1.25 | 8 | 2 | 3.4 | 0 | 9.7 | ssw. | 56 | s. | 11 | 12 | 4 | 15 | 5.6 | 56 |
| St. Joseph [2] | 967 | 5 | 51 | 984.1 | 1,020.4 | +.4 | 44 | 22 | 32.8 | +3.2 | 66 | 11 | 0 | 23 | 1,000 | 22 | 70 | 1.20 | −.1 | .51 | 7 | 1 | 5.2 | 0 | 11.4 | sse. | 54 | w. | 11 | 12 | 8 | 11 | 5.3 | 53 |
| Springfield, Mo. [2] | 1,324 | 5 | 50 | 972.9 | 1,021.8 | +1.8 | 49 | 29 | 38.9 | +3.4 | 73 | 11 | 15 | 23 | 806 | 30 | 76 | 4.46 | +2.2 | 1.29 | 12 | 4 | .4 | 0 | 12.0 | sse. | 55 | w. | 21 | 9 | 6 | 16 | 6.2 | 43 |
| Topeka [4] | 987 | 65 | 87 | 987.5 | 1,020.6 | +.6 | 45 | 25 | 35.2 | +3.2 | 62 | 3 | 12 | 14 | 929 | 24 | 72 | 2.11 | +1.1 | 1.23 | 6 | 2 | 3.8 | 0 | 10.1 | s. | 49 | sw. | 11 | 11 | 7 | 13 | 5.4 | 66 |
| Lincoln [4] | 1,189 | 6 | 81 | 974.9 | 1,019.5 | +.5 | 41 | 20 | 30.2 | +2.6 | 56 | 6 | 7 | 26 | 1,076 | 18 | 71 | .36 | −.4 | .19 | 5 | 0 | 3.3 | 0 | 10.0 | s. | 37 | s. | 16 | 11 | 6 | 14 | 5.7 | 57 |
| Norfolk, Nebr. [2] | 1,551 | 5 | 38 | 961.1 | 1,019.0 | | 38 | 14 | 26.2 | +1.7 | 54 | 28 | −1 | 14 | 1,203 | | | .35 | −.5 | .26 | 4 | 0 | 1.8 | 0 | | | | | | | | | 9 | 10 | 12 | 5.6 | -- |
| Omaha [2] | 1,105 | 5 | 68 | 978.3 | 1,019.7 | −.6 | 41 | 19 | 29.9 | +3.5 | 56 | 10 | 6 | 14 | 1,088 | 18 | 67 | .19 | −.7 | .10 | 7 | 0 | 1.2 | 0 | 12.4 | sse. | 47 | sw. | 16 | 7 | 10 | 14 | 6.2 | 48 |
| Valentine | 2,598 | 46 | 54 | 922.5 | 1,017.6 | −2.4 | 38 | 12 | 25.1 | +.5 | 63 | 2 | −3 | 13 | 1,235 | 14 | 71 | .43 | −.2 | .38 | 4 | 0 | 2.8 | 0 | 8.6 | | 32 | nw. | 11 | 13 | 9 | 9 | 5.0 | 74 |
| Sioux City [2] | 1,138 | 5 | 40 | 976.6 | 1,019.4 | −.6 | 38 | 13 | 25.6 | +4.0 | 54 | 11 | 0 | 14 | 1,221 | 16 | 71 | .29 | −.6 | .20 | 5 | 0 | 1.5 | 0 | 10.5 | nw. | 42 | sw. | 16 | 8 | 8 | 15 | 6.3 | 58 |
| Huron [2] | 1,301 | 5 | 41 | 964.4 | 1,018.6 | −1.7 | 30 | 9 | 19.6 | +.9 | 49 | 6 | −5 | 8 | 1,410 | 12 | 80 | 1.30 | +.7 | 1.24 | 4 | 0 | 1.9 | T | 11.8 | ssw. | 52 | se. | 24 | 8 | 10 | 13 | 6.5 | 57 |

See footnotes at end of table.

## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR DECEMBER 1949—Continued

| District and station | Elevation of instruments: Barometer above sea level [1] | Elevation of instruments: Thermometer above ground | Elevation of instruments: Anemometer above ground | Pressure: Station | Pressure: Sea level | Pressure: Departure from normal | Temperature of the air: Averages: Mean maximum | Temperature of the air: Averages: Mean minimum | Temperature of the air: Averages: Mean | Temperature of the air: Averages: Departure from normal | Temperature of the air: Extremes: Highest | Temperature of the air: Extremes: Date | Temperature of the air: Extremes: Lowest | Temperature of the air: Extremes: Date | Total heating degree days | Mean temperature of the dew-point | Mean relative humidity [3] | Precipitation: Total | Precipitation: Departure from normal | Precipitation: Greatest in 24 hours | Precipitation: Days with 0.01 inch or more | Precipitation: Days with thunderstorms | Precipitation: Total snowfall (unmelted) | Precipitation: Snow, sleet, and ice on ground at end of month | Wind: Average hourly speed | Wind: Prevailing direction | Wind: Speed of fastest mile: Miles per hour | Wind: Speed of fastest mile: Direction | Wind: Speed of fastest mile: Date | Character of day (sunrise to sunset) number of days: Clear | Character of day (sunrise to sunset) number of days: Partly cloudy | Character of day (sunrise to sunset) number of days: Cloudy | Sky cover, [2] tenths (sunset to sunset) | Possible sunshine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Ft.* | *Ft.* | *Ft.* | *Mbs.* | *Mbs.* | *Mbs.* | *°F.* | *°F.* | *°F.* | *°F.* | *°F.* | | *°F.* | | | *°F.* | % | *In.* | *In.* | *In.* | | | *In.* | *In.* | *m.p.h.* | | | | | *0-3* | *4-7* | *8-10* | *0-10* | |
| **NORTHERN SLOPE** | | | | | | | | | 20.4 | −2.6 | | | | | | | 66 | .63 | .0 | | | | | | | | | | | | | | 7.2 | |
| Billings [2] | 3,570 | 16 | 39 | 887.6 | 1,015.8 | −4.9 | 33 | 12 | 22.6 | −3.6 | 59 | 2 | −12 | 20 | 1,315 | 10 | 63 | .83 | | .45 | 8 | 0 | 11.1 | 1 | 12.6 | sw. | 65 | w. | 5 | 3 | 9 | 19 | 7.5 | 37 |
| Butte | 5,533 | 44 | 58 | 824.6 | 1,018.3 | | 32 | 5 | 18.2 | −2.2 | 46 | 1 | −26 | 20 | 1,446 | 10 | 66 | .34 | −.1 | .11 | 12 | 0 | 5.9 | 1 | 9.6 | nw. | | | | 2 | 5 | 24 | 8.4 | |
| Glasgow | 2,086 | 34 | 53 | 940.4 | 1,018.6 | | 19 | −2 | 8.5 | −7.1 | 56 | 2 | −27 | 20 | 1,752 | 3 | 76 | 1.49 | +1.0 | .47 | 15 | 0 | 15.3 | 14 | | | | | | 6 | 5 | 20 | 7.5 | |
| Great Falls [2] | 3,657 | 16 | 75 | 884.2 | 1,015.3 | | 31 | 9 | 19.8 | −8.2 | 51 | 2 | −16 | 20 | 1,398 | 8 | 64 | .53 | −.1 | .20 | 10 | 0 | 7.2 | T | 17.1 | sw. | 63 | sw. | 1 | 7 | 6 | 18 | 7.0 | 51 |
| Havre | 2,507 | 11 | 67 | 924.5 | 1,018.3 | −1.0 | 22 | 0 | 10.9 | −9.5 | 55 | 2 | −25 | 20 | 1,678 | | | .86 | +.2 | .22 | 11 | 0 | 11.5 | 8 | 7.9 | e. | 40 | w. | 2 | 2 | 9 | 20 | 7.9 | 28 |
| Helena [2] | 4,124 | 5 | 43 | 869.6 | 1,017.5 | −3.2 | 32 | 8 | 20.0 | −2.7 | 53 | 29 | −20 | 20 | 1,395 | 11 | 68 | .37 | −.1 | .14 | 8 | 0 | 9.3 | T | 6.6 | w. | 54 | sw. | 22 | 3 | 7 | 21 | 7.9 | 42 |
| Missoula [2] | 3,263 | 4 | 32 | 899.2 | 1,017.1 | −4.9 | 33 | 16 | 24.6 | +3.2 | 50 | 29 | −3 | 21 | 1,250 | 9 | 79 | .65 | −.3 | .14 | 12 | 0 | 8.5 | T | 5.0 | se. | 34 | sw. | 27 | 2 | 3 | 26 | 8.9 | 21 |
| Kalispell | 2,973 | 48 | 56 | 908.6 | 1,015.2 | −4.8 | 31 | 17 | 24.2 | −.7 | 54 | 29 | 1 | 21 | 1,265 | 18 | -- | .97 | −.5 | .15 | 18 | 0 | 16.1 | 2 | 10.4 | s. | | | | 0 | 6 | 25 | 8.9 | -- |
| Miles City [2] | 2,371 | 5 | 28 | 929.9 | 1,017.8 | −2.9 | 26 | 5 | 15.6 | | 63 | 2 | −14 | 20 | 1,536 | | | .20 | | .10 | 5 | 0 | 4.1 | 4 | 8.6 | sse. | | | | 5 | 5 | 21 | 7.6 | -- |
| Rapid City [2] | 3,259 | 5 | 56 | 898.7 | 1,017.0 | −3.3 | 35 | 9 | 22.2 | −2.9 | 60 | 2 | −6 | 12 | 1,331 | 11 | 70 | .47 | .0 | .21 | 7 | 0 | 5.0 | 1 | 15.0 | sse. | 65 | nw. | 10 | 8 | 11 | 12 | 6.1 | 50 |
| Cheyenne [2] | 6,094 | 22 | 40 | 807.3 | 1,016.4 | −2.4 | 40 | 15 | 27.5 | −1.0 | 59 | 2 | 0 | 20 | 1,160 | 9 | 50 | .26 | −.3 | .26 | 2 | 0 | 2.3 | T | 14.4 | w. | 49 | w. | 27 | 10 | 11 | 10 | 5.5 | 68 |
| Lander [2] | 5,352 | 6 | 30 | 824.6 | 1,017.8 | −4.2 | 33 | 8 | 20.6 | +.2 | 55 | 2 | −12 | 11 | 1,377 | 6 | 57 | .86 | +.2 | .65 | 5 | 0 | 16.4 | 4 | 6.1 | | 40 | sw. | 5 | 5 | 14 | 12 | 6.2 | 61 |
| Sheridan [2] | 3,790 | 5 | 38 | 880.8 | 1,016.7 | −3.6 | 35 | 8 | 21.8 | −1.0 | 65 | 2 | −11 | 20 | 1,339 | 9 | 64 | .50 | −.1 | .36 | 5 | 0 | 8.1 | 1 | 7.8 | nw. | 47 | sw. | 30 | 4 | 10 | 17 | 7.3 | 54 |
| North Platte [2] | 2,821 | 11 | 51 | 917.0 | 1,018.2 | −2.1 | 42 | 15 | 28.6 | +1.9 | 65 | 2 | −2 | 14 | 1,124 | 16 | 70 | .45 | −.1 | .45 | 2 | 0 | 2.4 | 0 | 8.4 | se. | 34 | n. | 11 | 13 | 12 | 6 | 4.4 | 63 |
| **MIDDLE SLOPE** | | | | | | | | | 36.5 | +2.4 | | | | | | | 61 | .71 | −.3 | | | | | | | | | | | | | | 4.5 | |
| Denver [4] | 5,292 | 106 | 113 | 833.4 | 1,015.6 | −3.0 | 48 | 23 | 35.2 | +2.9 | 69 | 5 | 6 | 12 | 923 | 10 | 46 | .24 | −.5 | .20 | 3 | 0 | 5.4 | 0 | 7.1 | s. | 32 | w. | 26 | 12 | 6 | 7 | 3.8 | 77 |
| Pueblo [2] | 4,690 | 5 | 36 | 854.4 | 1,017.0 | −2.0 | 51 | 15 | 33.0 | +2.9 | 71 | 5 | 0 | 12 | 992 | 7 | 42 | T | −.5 | T | 0 | 0 | T | 0 | 7.5 | w. | 51 | w. | 26 | 19 | 7 | 5 | 3.6 | 79 |
| Concordia | 1,392 | 50 | 58 | 967.8 | 1,019.3 | −1.0 | 42 | 22 | 31.9 | +1.2 | 61 | 2 | 7 | 26 | 1,024 | 21 | 71 | .57 | −.1 | .41 | 4 | 0 | 7.8 | T | 9.1 | | 40 | sw. | 16 | 16 | 8 | 10 | 4.5 | 61 |
| Dodge City [2] | 2,509 | 5 | 58 | 925.5 | 1,018.7 | −2.0 | 46 | 22 | 34.2 | +1.6 | 66 | 5 | 8 | 14 | 956 | 22 | 68 | .41 | −.2 | .28 | 2 | 0 | 4.3 | 0 | 13.5 | s. | 42 | sw. | 16 | 16 | 5 | 10 | 4.4 | 74 |
| Wichita [2] | 1,358 | 52 | 64 | 969.9 | 1,019.8 | +.2 | 47 | 27 | 37.2 | +2.6 | 64 | 3 | 13 | 14 | 861 | 26 | 68 | 1.22 | +.2 | .61 | 8 | 1 | 3.8 | 0 | 12.2 | s. | 51 | s. | 16 | 15 | 4 | 12 | 4.6 | 66 |
| Oklahoma City [4] | 1,214 | 10 | 47 | 973.2 | 1,020.8 | +.8 | 52 | 32 | 42.2 | +2.9 | 69 | 20 | 21 | 26 | 705 | 30 | 66 | 1.07 | −.4 | .67 | 7 | 2 | .9 | 0 | 15.5 | s. | 30 | w. | 11 | 16 | 2 | 13 | 4.9 | 55 |
| Tulsa [2] | 674 | 10 | 60 | 995.9 | 1,020.9 | | 53 | 31 | 41.7 | +2.9 | 70 | 11 | 19 | 14 | 725 | 31 | 69 | 1.44 | −.5 | .57 | 8 | 1 | T | 0 | 9.9 | s. | 41 | sw. | 11 | 11 | 16 | 14 | 5.6 | 48 |
| **SOUTHERN SLOPE** | | | | | | | | | 45.5 | +1.7 | | | | | | | 65 | 1.14 | −.1 | | | | | | | | | | | | | | 5.0 | |
| Abilene [2] | 1,755 | 4 | 59 | 957.7 | 1,019.7 | −.3 | 60 | 38 | 48.6 | +3.5 | 76 | 20 | 21 | 26 | 513 | 36 | 64 | 1.20 | −.1 | .71 | 6 | 2 | T | 0 | 13.4 | s. | 42 | s. | 24 | 12 | 5 | 14 | 5.6 | 52 |
| Amarillo [2] | 3,604 | 5 | 42 | 889.6 | 1,018.2 | −1.1 | 53 | 24 | 38.4 | +2.9 | 68 | 28 | 10 | 13 | 827 | 24 | 62 | .30 | −.5 | .18 | 6 | 1 | .1 | 0 | 12.4 | sw. | 50 | sw. | 10 | 18 | 5 | 8 | 5.7 | 70 |
| Del Rio | 960 | 68 | 71 | 885.1 | 1,018.9 | −.4 | 64 | 47 | 55.4 | +3.2 | 88 | 11 | 30 | 23 | 306 | 46 | 76 | 2.31 | +1.6 | 1.29 | 11 | 0 | .0 | 0 | 7.4 | se. | 31 | nw. | 21 | 6 | 8 | 17 | 6.9 | 32 |
| Roswell [2] | 3,614 | 6 | 29 | 893.0 | 1,019.6 | +.3 | 54 | 24 | 39.0 | −2.2 | 70 | 3 | 12 | 26 | 807 | 22 | 58 | .81 | +.2 | .31 | 3 | 1 | .2 | 0 | 6.0 | s. | 42 | nw. | 25 | 17 | 7 | 7 | 3.8 | 70 |
| Wichita Falls [2] | 1,030 | 4 | 49 | 983.4 | 1,020.5 | | 57 | 35 | 46.3 | +1.3 | 76 | 20 | 24 | 26 | 580 | 33 | 64 | 1.06 | −.5 | .66 | 9 | 0 | T | 0 | 14.6 | sse. | 55 | wnw | 11 | 12 | 7 | 12 | 5.1 | -- |
| **SOUTHERN PLATEAU** | | | | | | | | | 44.0 | −.3 | | | | | | | 54 | .83 | −.1 | | | | | | | | | | | | | | 3.4 | |
| El Paso [2] | 3,916 | 35 | 85 | 883.3 | 1,019.3 | +.7 | 56 | 32 | 44.0 | +.3 | 71 | 8 | 19 | 23 | 653 | 27 | 56 | .86 | +.3 | .40 | 4 | 1 | T | 0 | 9.8 | n. | 50 | w. | 21 | 16 | 7 | 8 | 3.9 | 75 |
| Albuquerque [2] | 5,314 | 5 | 45 | 849.3 | 1,019.8 | +.2 | 46 | 22 | 34.1 | −.4 | 61 | 7 | 8 | 13 | 958 | 19 | 56 | .59 | +.1 | .34 | 4 | 0 | 5.0 | T | 5.9 | n. | 52 | sw. | 10 | 18 | 8 | 5 | 3.0 | 76 |
| Flagstaff | 6,907 | 34 | 48 | 789.7 | | | 42 | 12 | 27.1 | −2.5 | 58 | 3 | −13 | 12 | 1,177 | 16 | 64 | 1.49 | −.5 | .89 | 7 | 0 | 15.0 | T | 5.8 | nnw. | | | | 18 | 4 | 9 | 4.0 | -- |
| Phoenix [4] | 1,107 | 39 | 87 | 977.3 | 1,016.7 | −.6 | 66 | 40 | 52.9 | +.9 | 83 | 1 | 28 | 12 | 386 | 35 | 58 | .92 | −.1 | .50 | 5 | 1 | T | 0 | 3.1 | e. | 34 | nw. | 10 | 21 | 4 | 6 | 2.9 | 80 |
| Tucson [2] | 2,555 | 5 | 39 | 927.2 | 1,016.0 | −1.3 | 64 | 38 | 50.8 | +.1 | 78 | 5 | 22 | 21 | 442 | 28 | 46 | .84 | −.2 | .64 | 4 | 2 | 1.4 | 0 | 7.1 | se. | 44 | w. | 10 | 17 | 4 | 10 | 3.8 | 80 |
| Yuma [2] | 142 | 9 | 54 | 1,011.9 | 1,016.4 | −1.2 | 68 | 42 | 54.8 | | 84 | 1 | 29 | 21 | 328 | 30 | 43 | .29 | | .28 | 3 | 0 | .0 | 0 | 5.8 | nne. | 35 | w. | 10 | 20 | 7 | 4 | 2.7 | 88 |
| **MIDDLE PLATEAU** | | | | | | | | | 28.5 | −.3 | | | | | | | 67 | .53 | −.5 | | | | | | | | | | | | | | 6.7 | |
| Ely [2] | 6,262 | 8 | 41 | 807.7 | | | 39 | 8 | 23.4 | −1.1 | 58 | 1 | −13 | 12 | 1,291 | | 67 | .43 | −.4 | .23 | 7 | 1 | 10.1 | 2 | 11.2 | | 37 | se. | 5 | 8 | 6 | 17 | 6.7 | 80 |
| Reno [2] | 4,527 | 20 | 52 | 862.2 | 1,018.8 | −2.5 | 47 | 16 | 31.6 | −.3 | 64 | 4 | −5 | 11 | 1,037 | 19 | 65 | .17 | −.8 | .10 | 3 | 0 | 3.3 | 0 | 4.3 | w. | 44 | sw. | 4 | 8 | 10 | 13 | 6.1 | 65 |
| Winnemucca [2] | 4,339 | 5 | 56 | 869.6 | 1,019.4 | −3.0 | 43 | 13 | 28.2 | −1.8 | 59 | 1 | −16 | 20 | 1,142 | 17 | 62 | .31 | −.8 | .13 | 6 | 0 | 3.8 | 0 | 7.9 | | 36 | nw. | 18 | 4 | 8 | 19 | 7.4 | 54 |
| Salt Lake City [2] | 4,357 | 32 | 58 | 871.7 | 1,019.4 | −2.6 | 38 | 22 | 30.1 | −.1 | 59 | 5 | 8 | 12 | 1,077 | 22 | 72 | 1.41 | .0 | .41 | 10 | 0 | 19.0 | 1 | 9.7 | sse. | 37 | nw. | 24 | 5 | 6 | 20 | 7.6 | 40 |
| Grand Junction [2] | 4,602 | 5 | 26 | 860.8 | 1,021.8 | +1.1 | 40 | 19 | 29.4 | +1.9 | 58 | 1 | 8 | 22 | 1,101 | 18 | 68 | .31 | −.3 | .15 | 6 | 0 | 3.0 | 0 | 5.1 | e. | 42 | s. | 19 | 11 | 6 | 14 | 5.6 | 61 |
| **NORTHERN PLATEAU** | | | | | | | | | 31.1 | +1.1 | | | | | | | 76 | .98 | −.9 | | | | | | | | | | | | | | 8.3 | |
| Baker [4] | 3,471 | 36 | 54 | 894.3 | 1,018.0 | −4.4 | 37 | 20 | 28.8 | +1.5 | 48 | 1 | 0 | 20 | 1,122 | | | .38 | −1.3 | .14 | 10 | 0 | 8.3 | 0 | 6.5 | se. | 31 | sw. | 5 | 1 | 7 | 23 | 8.4 | 46 |
| Meacham | 4,056 | 7 | 28 | 873.7 | 1,017.1 | | 34 | 22 | 28.4 | | 49 | 2 | 8 | 20 | 1,132 | 22 | 80 | 3.06 | | .55 | 20 | 0 | 41.0 | 17 | 8.3 | ese. | | | | 1 | 3 | 27 | 9.1 | -- |
| Boise [2] | 2,739 | 5 | 49 | 921.1 | 1,019.1 | −4.3 | 39 | 23 | 31.1 | +.8 | 52 | 29 | −1 | 20 | 1,051 | 23 | 73 | .68 | −.9 | .20 | 9 | 0 | 6.8 | 0 | 9.8 | ese. | 32 | se. | 17 | 1 | 9 | 21 | 7.7 | 32 |
| Lewiston | 1,436 | 4 | 23 | 964.1 | 1,016.8 | | 41 | 28 | 34.6 | | 56 | 1 | 8 | 19 | 942 | 26 | 74 | .77 | | .20 | 10 | 0 | 6.6 | 0 | 7.9 | e. | | | | 2 | 3 | 26 | 9.0 | -- |
| Pocatello [2] | 4,478 | 5 | 31 | 861.8 | 1,019.4 | −3.3 | 36 | 18 | 27.0 | +1.7 | 55 | 2 | 6 | 15 | 1,180 | 18 | 70 | .56 | −.6 | .18 | 9 | 0 | 7.4 | T | 10.8 | s. | 40 | s.e | 17 | 1 | 4 | 26 | 8.9 | 31 |
| Ellensburg [2] | 1,735 | 5 | 58 | 951.9 | 1,015.8 | | 38 | 22 | 30.2 | +1.6 | 50 | 22 | 7 | 19 | 1,081 | 26 | 84 | .24 | −1.2 | .06 | 10 | 0 | 4.9 | 1 | 7.9 | wnw. | | | | 4 | 9 | 18 | 7.5 | -- |
| Spokane [2] | 1,929 | 6 | 51 | 945.1 | 1,015.5 | −4.8 | 34 | 21 | 27.8 | −2.7 | 49 | 1 | −1 | 20 | 1,155 | 22 | 78 | 1.50 | −.7 | .38 | 17 | 0 | 13.8 | T | 11.5 | ssw. | 44 | sw. | 27 | 3 | 7 | 21 | 8.0 | 34 |
| Walla Walla | 991 | 57 | 65 | 980.4 | 1,016.9 | −3.8 | 45 | 32 | 38.6 | +3.1 | 62 | 29 | 19 | 19 | 816 | | | 1.47 | −.6 | .53 | 11 | 0 | 2.4 | 0 | 6.7 | s. | 36 | sw. | 24 | 0 | 4 | 27 | 8.9 | 17 |
| Yakima [2] | 1,076 | 4 | 54 | 976.0 | 1,015.8 | −4.2 | 44 | 23 | 33.6 | +1.4 | 58 | 27 | 10 | 19 | 973 | 25 | 72 | .15 | −.8 | .12 | 4 | 0 | 1.3 | 0 | 8.6 | w. | | | | 6 | 9 | 16 | 6.8 | -- |
| **NORTH PACIFIC COAST** | | | | | | | | | 39.4 | −.4 | | | | | | | 84 | 5.61 | −1.0 | | | | | | | | | | | | | | 8.7 | |
| Kelso [2] | 750 | 38 | 76 | | | | 45 | 34 | 39.4 | | 60 | 4 | 22 | 19 | 790 | 36 | 88 | 7.60 | | .96 | 23 | 1 | 1.2 | 0 | 10.1 | sse. | | | | 0 | 4 | 27 | 9.3 | -- |
| North Head | 211 | 5 | 55 | 1,007.5 | 1,015.2 | −1.4 | 47 | 39 | 43.0 | −1.1 | 55 | 4 | 29 | 19 | 682 | | | 9.19 | −.3 | 1.30 | 27 | 0 | .1 | 0 | 19.6 | e. | 70 | s. | 4 | 1 | 5 | 25 | 8.8 | 12 |
| Seattle [4] | 125 | 90 | 321 | 1,010.5 | 1,015.2 | −2.1 | 46 | 38 | 41.8 | −.8 | 57 | 1 | 27 | 19 | 722 | 36 | 84 | 4.59 | −1.0 | 1.22 | 20 | 0 | 1.9 | 0 | 11.3 | s. | 43 | s. | 4 | 2 | 6 | 23 | 8.4 | 25 |
| Tacoma | 194 | 172 | 201 | 1,007.8 | 1,014.9 | −2.7 | 45 | 36 | 40.3 | −.3 | 57 | 1 | 25 | 20 | 767 | | | 4.53 | −2.2 | 1.15 | 23 | 0 | 10.0 | 0 | 10.1 | s. | 42 | sw. | 17 | 1 | 7 | 23 | 8.4 | 19 |
| Tatoosh Island | 86 | 5 | 61 | 1,010.2 | 1,013.5 | −1.7 | 46 | 38 | 41.7 | −2.2 | 53 | 1 | 30 | 3 | 725 | 36 | 81 | 13.95 | +.6 | 2.84 | 27 | 0 | 4.5 | T | 20.8 | e. | 77 | s. | 28 | 2 | 4 | 25 | 8.7 | 14 |
| Burns | 4,162 | 35 | 47 | 872.0 | 1,018.5 | | 37 | 17 | 26.8 | +.5 | 49 | 29 | −7 | 20 | 1,185 | 20 | 74 | .71 | −.7 | .21 | 11 | 0 | 8.9 | 1 | | | | | | 2 | 12 | 17 | 7.5 | -- |
| Eugene [2] | 433 | 4 | 35 | 1,005.1 | 1,019.1 | | 47 | 33 | 40.0 | | 58 | 1 | 26 | 19 | 772 | 37 | 90 | 5.04 | | 1.20 | 19 | 0 | T | 0 | 8.5 | s. | | | | 1 | 5 | 25 | 8.7 | -- |
| Medford [2] | 1,329 | 29 | 58 | 972.2 | 1,021.2 | +1.2 | 44 | 30 | 37.1 | −1.0 | 62 | 4 | 22 | 31 | 865 | 32 | 86 | 1.19 | −1.7 | .36 | 14 | 0 | T | 0 | 5.5 | se. | | | | 2 | 4 | 25 | 8.9 | -- |
| Portland, Oreg. [4] | 154 | 68 | 106 | 1,011.9 | 1,017.6 | −1.4 | 47 | 38 | 42.6 | +1.4 | 56 | 1 | 28 | 19 | 694 | 36 | 82 | 5.44 | −1.3 | 1.22 | 21 | 0 | T | 0 | 6.0 | sw. | 26 | s. | 23 | 0 | 5 | 26 | 9.1 | 32 |
| Roseburg | 510 | 45 | 76 | 1,001.0 | 1,020.0 | +.4 | 48 | 36 | 41.8 | .0 | 69 | 4 | 29 | 30 | 724 | | | 3.82 | −1.5 | .90 | 16 | 0 | T | 0 | 4.0 | s. | 29 | sw. | 4 | 1 | 3 | 27 | 8.8 | 25 |

See footnotes at end of table.

## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR DECEMBER 1949—Continued

| District and station | Elevation of instruments: Barometer above sea level [1] | Elevation of instruments: Thermometer above ground | Elevation of instruments: Anemometer above ground | Pressure: Station | Pressure: Sea level | Pressure: Departure from normal | Temperature of the air: Averages: Mean maximum | Mean minimum | Mean | Departure from normal | Extremes: Highest | Date | Lowest | Date | Total heating degree days | Mean temperature of the dew-point | Mean relative humidity [6] | Precipitation: Total | Departure from normal | Greatest in 24 hours | Days with 0.01 inch or more | Days with thunderstorms | Total snowfall (unmelted) | Snow, sleet, and ice on ground at end of month | Wind: Average hourly speed | Prevailing direction | Speed of fastest mile: Miles per hour | Direction | Date | Character of day (sunrise to sunset [1]), number of days: Clear | Partly cloudy | Cloudy | Sky cover [7] tenths (sunrise to sunset) | Possible sunshine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ft. | Ft. | Ft. | Mbs. | Mbs. | Mbs. | °F | °F. | °F. | °F. | °F. | | °F. | | | °F. | % | In. | In. | In. | | | In. | In. | m. p. h. | | | | | 0-3 | 4-7 | 8-10 | 0-10 | % |
| **MIDDLE PACIFIC COAST** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eureka | 60 | 72 | 88 | 1,018.6 | ----- | ----- | 53 | 38 | 46.4 | −1.6 | 68 | 4 | 30 | 20 | 602 | ---- | 74 | 2.48 | −2.0 | | | | | | | | | | | | | | 5.7 | |
| Red Bluff [3] | 353 | 5 | 26 | 1,007.1 | 1,019.2 | ----- | 54 | 34 | 45.6 | −2.6 | 68 | 4 | 30 | 20 | 602 | ---- | -- | 4.49 | −1.8 | 1.16 | 17 | 0 | T | 0 | 6.1 | ----- | 28 | s. | 4 | 4 | 8 | 19 | 7.0 | 51 |
| Sacramento [4] | 66 | 92 | 115 | 1,017.6 | 1,019.4 | −.6 | 53 | 37 | 44.4 | −1.4 | 67 | 8 | 25 | 13 | 639 | 32 | 68 | .74 | −3.7 | .37 | 6 | 0 | .0 | 0 | 7.5 | nw. | 35 | se. | 17 | 5 | 13 | 13 | 6.3 | 67 |
| San Francisco [4] | 155 | 112 | 132 | 1,018.6 | 1,019.0 | −.3 | 56 | 45 | 50.6 | −.7 | 60 | 8 | 28 | 11 | 628 | 36 | 80 | 1.90 | −1.1 | .65 | 9 | 0 | .0 | 0 | 9.0 | se. | 25 | nw. | 10 | 12 | 6 | 13 | 5.5 | 53 |
| | 155 | 112 | 132 | 1,018.6 | 1,019.0 | −.3 | 56 | 45 | 50.6 | −.7 | 68 | 1 | 40 | 12 | 448 | 39 | 74 | 2.77 | −1.2 | .98 | 10 | 0 | .0 | 0 | 8.6 | wnw. | 28 | se. | 14 | 17 | 6 | 8 | 4.1 | 64 |
| **SOUTH PACIFIC COAST** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fresno [3] | 327 | 5 | 34 | 1,007.5 | 1,019.0 | −1.3 | 54 | 34 | 51.5 | −.9 | 69 | 29 | 25 | 13 | 645 | 38 | 72 | 1.45 | −.5 | | | | | | | | | | | | | | 4.3 | |
| Los Angeles [4] | 338 | 236 | 263 | 1,013.5 | 1,016.8 | +1.5 | 65 | 46 | 44.1 | −1.0 | 80 | 4 | 37 | 12 | 294 | 39 | 84 | .78 | −.7 | .50 | 7 | 0 | .0 | 0 | 5.9 | nw. | 43 | nw. | 10 | 8 | 9 | 14 | 6.0 | 60 |
| San Diego [3] | 87 | 20 | 55 | 1,013.9 | 1,016.7 | −.9 | 65 | 45 | 55.6 | −1.0 | 77 | 4 | 36 | 12 | 313 | 41 | 66 | 2.72 | +.1 | 1.85 | 5 | 0 | .0 | 0 | 5.6 | w. | 27 | nw. | 10 | 20 | 4 | 7 | 3.3 | 81 |
| | | | | | | | | | 54.8 | −.7 | | | | | | | 66 | .86 | −1.0 | .35 | 6 | 0 | .0 | 0 | 6.0 | n. | 32 | w. | 10 | 18 | 10 | 3 | 3.5 | 72 |
| **PACIFIC AREA** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Canton Island [3] | 12 | --- | --- | 1,007.1 | 1,007.5 | ----- | 88 | 78 | 83.2 | ----- | 92 | 7 | 76 | 5 | 0 | 70 | 70 | .17 | ----- | .14 | 2 | 0 | .0 | 0 | ---- | ----- | --- | ----- | --- | 10 | 14 | 7 | 4.9 | -- |
| Wake Island [3] | 13 | --- | --- | 1,013.9 | 1,014.6 | ----- | 83 | 75 | 78.8 | ----- | 85 | 6 | 68 | 14 | 0 | 68 | 73 | .64 | ----- | .22 | 9 | 0 | .0 | 0 | 10.0 | e. | --- | ----- | --- | 19 | 10 | 2 | 3.6 | -- |
| *West Indies* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| San Juan, P. R. | 82 | 9 | 54 | 1,011.2 | 1,014.2 | ----- | 82 | 69 | 75.3 | ----- | 85 | 23 | 64 | 14 | 0 | ---- | -- | 10.16 | ----- | 2.38 | 27 | 2 | .0 | 0 | 9.7 | e. | 38 | n. | 13 | 2 | 20 | 9 | 6.2 | 45 |
| *Alaska* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anchorage [3] | 132 | 6 | 44 | 1,008.1 | 1,013.2 | ----- | 14 | 0 | 6.8 | −6.5 | 37 | 11 | −25 | 26 | 1,799 | 1 | 71 | 1.45 | +.6 | .58 | 12 | 0 | 25.9 | 16 | ---- | ne. | 26 | nw. | 8 | 8 | 2 | 21 | 7.1 | -- |
| Annette Island | 113 | 5 | 53 | 1,007.1 | 1,011.2 | ----- | 35 | 26 | 30.2 | −5.2 | 46 | 4 | 2 | 31 | 1,079 | 24 | 76 | 5.36 | −4.0 | 1.11 | 15 | 0 | 2.3 | T | 10.8 | n. | --- | ----- | --- | 4 | 6 | 21 | 7.6 | -- |
| Barrow | 29 | 5 | 27 | 1,020.7 | 1,021.3 | ----- | −4 | −16 | −10.0 | −1.9 | 25 | 13 | −31 | 3 | 2,334 | −17 | 67 | .11 | −.1 | .09 | 2 | 0 | .4 | 6 | 11.4 | ene. | 35 | e. | 10 | 7 | 13 | 11 | 5.9 | -- |
| Bethel [3] | 28 | 5 | 31 | 1,011.9 | 1,013.2 | ----- | 13 | 0 | 6.4 | −.6 | 35 | 31 | −28 | 25 | 1,818 | 2 | 82 | 1.95 | +1.1 | .81 | 12 | 0 | 13.3 | 12 | 7.6 | ne. | 38 | nne. | 1 | 4 | 4 | 23 | 7.9 | -- |
| Cordova [3] | 45 | 5 | 32 | 1,006.4 | 1,008.5 | ----- | 26 | 11 | 18.6 | −5.3 | 41 | 1 | −16 | 31 | 1,439 | 17 | 90 | 4.14 | −3.4 | .93 | 15 | 1 | 40.9 | 6 | 3.8 | e. | 40 | ese. | 7 | 9 | 6 | 16 | 6.3 | -- |
| Fairbanks [3] | 455 | 5 | 63 | 1,001.0 | 1,019.6 | ----- | −3 | −18 | −10.5 | −8.0 | 22 | 8 | −46 | 31 | 2,345 | −16 | 73 | .77 | +.1 | .22 | 11 | 0 | 12.5 | 13 | ---- | n. | 26 | w. | 8 | 5 | 2 | 24 | 7.9 | -- |
| Galena | 139 | 4 | 66 | 1,012.9 | 1,018.0 | ----- | −3 | −18 | −10.6 | +.2 | 19 | 12 | −46 | 30 | 2,339 | −20 | 62 | .71 | −.2 | .26 | 6 | 0 | 7.1 | 19 | 5.2 | n. | --- | ----- | --- | 6 | 3 | 22 | 7.4 | -- |
| Juneau [3] | 80 | 6 | 30 | 1,012.5 | 1,013.5 | ----- | 26 | −16 | 21.0 | −7.1 | 38 | 1 | −21 | 31 | 1,364 | 14 | 77 | 2.35 | −1.8 | .63 | 17 | 0 | 19.8 | 15 | ---- | e. | 30 | se. | 8 | 10 | 1 | 20 | 6.6 | -- |
| Kotzebue [3] | 20 | 5 | 31 | 1,017.3 | 1,018.0 | ----- | 3 | −9 | −3.2 | −.7 | 26 | 12 | −28 | 29 | 2,113 | −9 | 76 | .27 | −.5 | .09 | 8 | 0 | 2.7 | 10 | ---- | ese. | --- | ----- | --- | 2 | 6 | 23 | 8.3 | -- |
| McGrath [3] | 341 | 5 | 31 | 1,004.1 | 1,017.6 | ----- | −3 | −21 | −12.2 | −4.4 | 22 | 19 | −49 | 30 | 2,391 | −18 | 68 | 1.09 | −.2 | .36 | 11 | 0 | 18.6 | 17 | ---- | nw. | --- | ----- | --- | 7 | 2 | 22 | 7.4 | -- |
| Nome [3] | 22 | 10 | 75 | 1,015.2 | 1,015.9 | ----- | 11 | 0 | 5.6 | −1.9 | 30 | 12 | −23 | 23 | 1,849 | 1 | 81 | 2.21 | −1.1 | 1.34 | 9 | 0 | 15.4 | 21 | ---- | e. | 72 | e. | 31 | 4 | 3 | 24 | 8.0 | -- |
| Northway [3] | 1,718 | 5 | 32 | 952.9 | 1,020.7 | ----- | −9 | −26 | −17.2 | −.3 | 15 | 8 | −62 | 31 | 2,532 | −18 | 76 | .62 | +.2 | .36 | 7 | 0 | 8.6 | 16 | 1.9 | se. | --- | ----- | --- | 8 | 0 | 23 | 7.3 | -- |
| St. Paul Island | ----- | ----- | ----- | 1,005.8 | 1,006.8 | ----- | 35 | 26 | 30.2 | +1.9 | 40 | 16 | 10 | 6 | 1,080 | 27 | 84 | 4.18 | +1.9 | .75 | 22 | 0 | 6.7 | 0 | ---- | ----- | --- | ----- | --- | 1 | 8 | 22 | 8.5 | -- |
| Yakutat | ----- | ----- | ----- | 1,009.5 | 1,010.8 | ----- | 30 | 17 | 23.1 | −6.8 | 42 | 4 | −15 | 31 | 1,299 | 20 | 83 | 7.42 | −5.1 | 1.54 | 20 | 1 | 26.8 | 17 | ---- | ese. | --- | ----- | --- | 9 | 2 | 20 | 9.0 | -- |
| *Hawaii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Honolulu [4] | 38 | 86 | 93 | 1,014.2 | 1,014.6 | ----- | 77 | 69 | 72.9 | +.5 | 80 | 15 | 63 | 21 | 0 | 63 | 72 | 1.61 | −2.4 | 1.21 | 11 | 2 | .0 | 0 | 10.6 | ene. | 26 | ne. | 29 | 9 | 13 | 9 | 5.5 | 65 |

[1] Height of barometer cistern above mean sea level on Jan. 1, 1900, or when station was first established since Jan. 1, 1900. When station is moved to new location or airport, the pressure is reduced to the original elevation for homogeneity. These elevations do not represent the present station elevation in most cases.

[3] Data are from airport records. Pressures adjusted to original elevations, according to note 1.

[3] Barometric hygrometric, wind, character of day, and average cloudiness data from airport records; remainder from city office records.

[4] Barometric and hygrometric data from airport records, remainder from city office records.

[5] Barometric, temperature, degree day, and hygrometric data from airport, remainder from city office records.

[6] As of Jan. 1, 1949, relative humidity values at temperatures below 32° F. are expressed with respect to water rather than with respect to ice, as used prior to that date. Therefore, these hygrometric values before and after Jan. 1, 1949, cannot accurately be combined without necessary conversion.

[7] As of Jan. 1, 1949, "Sky cover" has been substituted for "Average cloudiness" to include smoke, snow, etc., in addition to clouds that obscure the sky.

NOTE.—Unless otherwise indicated, data in table are city office records.

## SEVERE STORMS FOR DECEMBER 1949

[The table hereunder contains such data as have been received concerning severe local storms that occurred during the month]

| Place | Date | Time | Width of path, yards | Loss of life | Value of property destroyed | Character of storm | Remarks |
|---|---|---|---|---|---|---|---|
| Babb, Mont. | 1 | | | | | Wind | Telephone poles and small buildings blown down. |
| Great Falls, Mont. | 1–2 | | | | | do | High winds prevailed on 1st and 2d, with gusts over 60 m. p. h. near midday, when fastest mile recorded as 63 m. p. h. and 61 m. p. h. respectively. No major damage reported. |
| Lake Michigan | 3 | All day | | | | Southerly gales | 2 ships loaded with grain and 1 loaded with paper southbound on Lake Michigan for Milwaukee sustained some damage by heavy seas to both cargoes and ships. |
| Marinette (near), Wis. | 6 | | | 1 | | Blowing snow | Man struck and killed by auto. Cause of accident attributed to blowing snow. |
| Santa Barbara, Calif. | 7–8 | 8 p. m., 7th–8th | [1] 50 | | $150,000 | Winds | Strong southeasterly winds swept Santa Barbara Harbor during night, reaching a speed of 38 m. p. h. By midnight beach was littered with broken masts, propellers, radios, life preservers, and boats. 20 boats beached, 7 sunk, and many others were riding anchor against one another. Storm was worst to hit harbor in 6 years. |
| Madera, Fresno, Kings, and Tulare Counties, Calif. | 9–10 | 8 p. m., 9th–5:29 p. m., 10th. | | 2 | 20,000 | do | Near record winds caused severe damage in San Joaquin Valley. A maximum speed for 5 minutes at Fresno of 40 m. p. h. was a new record for December and 1 m. p. h. less than all time record of 41 m. p. h. established on Jan. 27, 1916. On Yocum Ranch near Hanford a large eucalyptus tree blew down across a tent and a parked automobile, killing man asleep in tent and another sleeping in parked automobile. Christmas decorations in business districts ruined. Strong winds raised soils from plowed areas around the Fresno Air Terminal, reducing visibility at times to ¼ mile. Winds also downed limbs and trees, damaged buildings, shattered neon tubing of hundreds of signs, broke windows, and ripped roofing off garages and other small buildings. |
| San Diego County, Calif. | 10 | 2:30 a. m.–9 p. m. | | | 20,000 | do | Winds, reaching speed of 32 m. p. h. or more, and accompanied by rain and hail, ripped through San Diego. Trees downed, fishing boats battered and at least 1 sunk, power and telephone service disrupted, windows broken, signs blown down, and streets littered with tree branches, and debris. Some avocados and oranges blown from trees, and others scarred. |
| Tucson, Ariz. | 10 | 10 a. m.–10:30 p. m. | [1] 60 | | 1,500 | do | Struck metropolitan area with gusts to 60 m. p. h. Major damage caused by falling trees and flying limbs. Several automobiles damaged by falling trees. Plate glass windows smashed. Serious power and telephone disruption. Elderly man died from exposure in an unheated house during night following storm. |
| Winn Parish, La. | 10 | 6:15 p. m. | 10 | 0 | 15,000 | Tornado | Moving northeastward tornado passed near Calvin community; 1 person seriously injured. 1 home destroyed and 4 others seriously damaged; several outbuildings damaged. |
| Round Mountain, Ark. | 11 | 2:30 a. m. | | 1 | | Electrical | Lightning struck a power pole, causing ground wire to sag onto "live" wire; then current ran on neutral wire into home and into electric range. Owner ran into yard, and was electrocuted when he came into contact with sagging wire. House destroyed by fire. |
| Muskogee (4 miles west of), Okla. | 11 | 10 a. m. | 16 | 0 | 250 | Tornado | A "baby twister," moving northward, dipped down for a moment. Path on ground less than 50 feet long. 1 auto shed lifted above telephone wires and set down about 50 feet farther north. |
| Santa Monica, Calif. | 11 | Early morning. | | | 500 | Winds | 1 tugboat rammed on piling and sunk. Small boats slightly damaged by action of wind and waves. |
| Hannibal, Mo. | 11 | 12:25 p. m. | 200 | | 200,000 | Tornadic | Path about 6 miles long. Damage spread over 20-block area. Houses and buildings damaged, trees uprooted, and automobiles smashed. 3 persons hospitalized and many injured by flying glass and debris. Slight damage to power and telephone lines reported. Storm crossed Mississippi River into Illinois. |
| Clinton, Ark. | 11 | 1:15 p. m. | 220 | 0 | 75,000 | Tornado | Principal damage to east edge of Clinton, and east of town. Damage to houses and barns and to hay and corn crops. Some loss of poultry and livestock. Path of storm northeastward. |
| Providence, Ark. | 11 | 2:46 p. m. | 660 | 1 | 50,000 | do | 7 persons injured. Considerable damage to houses and barns; about 15 buildings destroyed. Path northeastward for 4½ miles. |
| Madison County (northern portion), Ill. | 11 | 3 p. m. | 100 | 0 | 5,000 | do | Several farm buildings damaged. |
| Albany, Mo. | 11 | 3 p. m. | | | | Wind | Estimated winds of 55 to 60 m. p. h. destroyed some small buildings. |
| Cross Roads Community, Ark. | 11 | 3–4 p. m. | | 4 | 2,000 | Tornado | Principal damage at Cross Roads Community, 3½ miles northwest of Bradford. 4 persons injured. |
| Poplar Bluff (near), Butler County, Mo. | 11 | 3:45 p. m. | 30–440 | 6 | 100,000 | do | Rural homes and farm buildings destroyed by storm and resulting fires and wreckage. Path of storm about 10 miles long. Trees uprooted and power lines downed. Livestock killed. Some stored stock and supplies destroyed by wind and rain. At least 12 persons required hospitalization. Damage confined to rural sections. |
| Pana-Dollville area, Ill. | 11 | 4 p. m. | 100 | 0 | 20,000 | do | Several homes badly damaged in Pana. Storm also struck a number of farms near Dollville. 1 person injured. |
| Modesto, Macoupin County, Ill. | 11 | 4:30 p. m. | | 1 | | Electrical | 1 death caused by lightning. |
| Milan (near), Gibson County, Tenn. | 11–12 | During night. | | | | Rain, wind and electrical. | Damage to power lines, buildings, some timber, roads, and bridges. Heavy damage to ungathered crops and pastures in lowlands. |
| Chippewa Falls (near), Wis. | 11 | P. m. | | | 15,000 | Thunderstorm, with wind. | 2 large barns blown down; 1 country school unroofed. 5 head of cattle killed in 1 of the barns, and 1 person injured. |
| Milwaukee, Wis. | 11 | | | | | Southwesterly gales. | Minor disruption to electric service because of broken and fallen wires. |
| Butte, Mont. | 15 | | | 1 | | Cold wave | An elderly man who became lost was frozen to death. |
| Nebraska | 16 | Noon–2 p. m. | | | 400 | Wind | Rather strong barometric gradient developed over extreme southeastern Nebraska. Dusty with visibility reduced to 2 miles at airport station, where gusts up to 55 m. p. h. at 1:10 and 1:28 p. m. 2 plate glass windows shattered in Lincoln. |
| Wallace and vicinity, Shoshone County, Idaho. | 17–23 | | | | | Heavy snow | Utilities and communications suffered from broken towers, wires, etc. Numerous traffic accidents. Damage estimated at several thousand dollars. |

[1] Miles instead of yards.

SEVERE STORMS FOR DECEMBER 1949—Continued

| Place | Date | Time | Width of path, yards | Loss of life | Value of property destroyed | Character of storm | Remarks |
|---|---|---|---|---|---|---|---|
| Kansas, southeastern counties. | 21 | Midnight-afternoon. | | | | Ice and sleet | Sleet, turning to freezing rain or glaze, fell over much of eastern third of state, but of consequence in 13 southeastern counties. Tree limbs broken; power and communication lines damaged; and highways made icy and dangerous. Conditions in some localities remained severe for 2 or 3 days. |
| Illinois, extreme west-central portion. | 21 | All day | | | 600,000 | Ice | Heavy damage to communication and power lines by freezing rain, especially in Quincy area; several days required to fully restore telephone and power services. Hundreds of trees ruined. Most damage in Quincy and Adams Counties. |
| Iowa, extreme eastern and extreme southern portions. | 21-22 | Night of 21 and morning of 22. | | | | Ice and sleet | Freezing rain left glaze coating of 1/4 to 3/4 inch over nearly all objects. Glaze persisted until 25th. Hazardous driving conditions most serious result. Only minor interruptions of power and communications. |
| Wisconsin, southwestern portion. | 21-22 | Night | | | | Ice | Several minor accidents occurred because of hazardous driving conditions due to freezing rain. |
| Long Beach, Pacific County, Wash. | 23 | 11 a. m | 17 | 0 | 1,000 | Tornadic | During a straight southwesterly wind, estimated 50 to 60 m. p. h., a destructive twisting wind of very brief duration and with a path of only about 100 yards long in a northeasterly direction developed over the ocean beach ridge at Long Beach, Wash. 1 dwelling completely unroofed, a garage demolished, and several adjoining houses damaged partially. A large tree twisted off about 10 feet above ground. Unstable air conditions and some thunderstorm activity, together with twisting wind effects observed, appear to confirm this wind as a tornado of brief duration, the first ever observed in the Long Beach area. |
| Great Falls, Mont | 25 | | | 1 | | Wind | Gusts of 50 m. p. h. drifted snow. Man overworked himself shoveling his car out of snowbank. |
| Clallam County (north-central portion) and Straits of Juan de Fuca, Wash. | 28 | Noon to midnight. | | | | Winds | During a general storm, south to west winds reached destructive velocities in north-central Clallam County. In the Elwha River Valley, from Lake Crescent to beyond Elwha, south winds estimated at 60 m. p. h. toppled many large trees, disrupting electric and communication lines and highway traffic. Wind damage further complicated by high water in local streams and mud slides on Olympic and other highways. Damage to timber probably considerable. |

# SOLAR RADIATION DATA FOR DECEMBER 1949

Explanation of tables 1 and 2 and references to descriptions of instruments, stations, and methods of observation, and to summaries of data, are given in the MONTHLY WEATHER REVIEW, vol. 72, No. 1, January 1944, p. 43. A list of pyrheliometric stations is given on page 45 of that issue. An explanation of the formula used in computing the air mass values for each station listed in table 1 appears in vol. 75, No. 3, March 1947, p. 47.

TABLE 1.—*Solar radiation intensities during December 1949*

[Gram calories per minute per square centimeter of normal surface]

| Date | Sun's zenith distance | | | | | | | | | Vapor pressure | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A. M. | | | | 0.0° | P. M. | | | | | |
| | 78.7° | 75.7° | 70.7° | 60.0° | | 60.0° | 70.7° | 75.7° | 78.7° | 7:30 a. m.[1] | 1:30 p. m.[1] |
| **MADISON, WIS.** | | | | | | | | | | | |
| | Air mass | | | | | | | | | | |
| | 4.81 | 3.84 | 2.88 | 1.92 | *0.96 | 1.92 | 2.88 | 3.84 | 4.81 | | |
| *December* | | | | | | | | | | mb. | mb. |
| 8 | 0.95 | 1.08 | 1.21 | | | | 1.21 | | | 3.0 | 4.0 |
| 8 | 1.01 | 1.14 | 1.26 | | | | | | | 1.6 | 1.5 |
| 12 | .86 | .95 | 1.07 | | | | | | | 1.7 | 1.7 |
| 13 | .91 | 1.07 | 1.22 | | | | | | | 1.7 | 1.7 |
| 14 | .88 | 1.10 | 1.22 | | | | | | | 1.0 | 1.4 |
| 23 | .94 | | | | | | | | | .8 | 1.4 |
| 24 | .62 | .91 | 1.08 | | | | | | | .8 | 2.0 |
| 30 | .32 | .42 | .68 | | | | | | | 4.8 | 5.8 |
| Means | .81 | .95 | 1.11 | | | | 1.21 | | | | |
| Departures | −.08 | −.07 | −.06 | | | | +.02 | | | | |
| **LINCOLN, NEBR.** | | | | | | | | | | | |
| | Air mass | | | | | | | | | | |
| | 4.77 | 3.81 | 2.86 | 1.91 | *0.95 | 1.91 | 2.86 | 3.81 | 4.77 | | |
| *December* | | | | | | | | | | mb. | mb. |
| 4 | | | | | | | 1.11 | 0.96 | 0.83 | 3.3 | 4.0 |
| 12 | 0.83 | 1.00 | 1.13 | | | | 1.06 | .96 | .87 | 1.2 | 1.4 |
| 15 | .74 | .85 | 1.02 | | | | 1.03 | .90 | .81 | 2.2 | 3.2 |
| 23 | | .96 | 1.13 | | | | 1.15 | 1.02 | .94 | 2.0 | 1.7 |
| 27 | .87 | .96 | | | | | | | | 3.0 | 3.5 |
| Means | .81 | .95 | 1.09 | | | | 1.09 | .96 | .86 | | |
| Departures | −.13 | −.13 | −.12 | | | | −.10 | −.09 | −.08 | | |
| **TABLE MOUNTAIN, CALIF.** | | | | | | | | | | | |
| | Air mass | | | | | | | | | | |
| | 3.76 | 3.01 | 2.26 | 1.51 | *0.75 | 1.51 | 2.26 | 3.01 | 3.76 | | |
| *December* | | | | | | | | | | mb. | mb. |
| 2 | | | | 1.56 | | | | | | | |
| 4 | 1.25 | 1.33 | 1.43 | 1.53 | | | | | | | |
| 8 | | | | 1.52 | | | | | | | |
| 12 | | | | 1.52 | | | | | | | |
| 13 | | | | 1.52 | | | | | | | |
| 22 | | | | 1.52 | | | | | | | |
| 24 | | | | 1.52 | | | | | | | |
| 26 | | | | 1.54 | | | | | | | |
| 27 | 1.22 | 1.30 | 1.41 | 1.54 | | | | | | | |
| Means | 1.24 | 1.32 | 1.42 | 1.53 | | | | | | | |
| Departures | 0 | 0 | −.01 | 0 | | | | | | | |

TABLE 1.—*Solar radiation intensities during December 1949—Con.*

[Gram calories per minute per square centimeter of normal surface]

| Date | Sun's zenith distance | | | | | | | | | Vapor pressure | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A. M. | | | | 0.0° | P. M. | | | | | |
| | 78.7° | 75.7° | 70.7° | 60.0° | | 60.0° | 70.7° | 75.7° | 78.7° | 7:30 a. m.[1] | 1:30 p. m.[1] |
| **BOSTON, MASS.** | | | | | | | | | | | |
| | Air mass | | | | | | | | | | |
| | 4.96 | 3.96 | 2.97 | 1.98 | *0.99 | 1.98 | 2.97 | 3.96 | 4.96 | | |
| *December* | | | | | | | | | | mb. | mb. |
| 6 | | 1.07 | 1.27 | | | | | | | 3.1 | 1.8 |
| 8 | 0.90 | 1.02 | 1.24 | | | | 1.17 | 1.03 | 0.90 | 2.3 | 2.5 |
| 9 | .61 | .75 | 1.03 | | | | | | | 2.2 | 2.3 |
| 15 | | | .90 | | | | 1.05 | .85 | .76 | 2.4 | 1.8 |
| 16 | .82 | .86 | .99 | | | | .96 | .81 | .62 | 2.2 | 2.1 |
| 28 | .85 | .96 | | | | | | | | 4.4 | 3.6 |
| 29 | | | | | | | 1.27 | 1.10 | .99 | 4.2 | 2.5 |
| 30 | | | | | | | 1.24 | 1.16 | 1.05 | .9 | 1.7 |
| Means | .80 | .93 | 1.09 | | | | 1.14 | .99 | .86 | | |
| Departures | +.07 | +.07 | +.08 | | | | +.11 | +.09 | +.06 | | |
| **BLUE HILL, MASS.** | | | | | | | | | | | |
| | Air mass | | | | | | | | | | |
| | 4.86 | 3.89 | 2.92 | 1.94 | *0.97 | 1.94 | 2.92 | 3.89 | 4.86 | | |
| *December* | | | | | | | | | | mb. | mb. |
| 3 | | | | | | | 1.01 | 0.87 | 0.74 | 4.4 | 3.6 |
| 5 | | | | | | | | .93 | .78 | 6.0 | 5.2 |
| 6 | 0.97 | 1.07 | 1.28 | | | | 1.26 | 1.16 | 1.09 | 2.7 | 1.8 |
| 8 | 1.03 | 1.14 | 1.27 | | | | | 1.10 | .99 | 2.0 | 1.7 |
| 9 | .85 | .99 | 1.12 | | | | | | | 1.8 | 2.5 |
| 10 | 1.14 | 1.20 | 1.32 | | | | 1.12 | .86 | .81 | 1.7 | 2.7 |
| 15 | 1.01 | 1.09 | 1.19 | | | | 1.21 | 1.10 | .98 | 1.8 | 1.7 |
| 16 | 1.09 | 1.18 | 1.26 | | | | 1.21 | 1.10 | .98 | 1.7 | 1.5 |
| 24 | 1.07 | 1.15 | 1.24 | | | | 1.25 | 1.10 | .99 | 2.9 | 1.9 |
| 25 | .91 | .98 | 1.12 | | | | 1.10 | | | 2.6 | 3.5 |
| 28 | .91 | .97 | | | | | 1.21 | 1.07 | .97 | 3.9 | 3.2 |
| 29 | .59 | | | | | | 1.29 | 1.20 | 1.12 | 3.5 | 2.0 |
| 30 | 1.16 | 1.24 | 1.37 | | | | 1.32 | 1.22 | 1.10 | 1.0 | 1.3 |
| 31 | 1.09 | 1.18 | 1.27 | | | | | | | 1.4 | 2.2 |
| Means | .99 | 1.11 | 1.24 | | | | 1.20 | 1.06 | .96 | | |
| Departures | +.08 | +.07 | +.07 | | | | +.04 | +.02 | 0 | | |
| **RATIO, BOSTON/BLUE HILL ON COMPARABLE DATES** | | | | | | | | | | | |
| | 0.82 | 0.87 | 0.89 | | | | 0.90 | 0.87 | 0.83 | | |

*Extrapolated.

[1] 75th Meridian Time.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct + diffuse) received on a horizontal surface during December 1949*

[Gram-calories per square centimeter]

| Date | Honolulu, T. H. | Pearl Harbor, T. H. | La Jolla, Calif. / | Riverside, Calif. | Nashville, Tenn. | Fresno, Calif. | Davis, Calif. | Washington, D. C. | Columbia, Mo. | Soda Springs, Calif. | Seabrook, N. J. | Grand Lake, Colo. | Salt Lake City, Utah | New York, N. Y. | State College, Pa. | Lincoln, Nebr. | Newport, R. I. | Put-in-Bay, Ohio | East Wareham, Mass. | Blue Hill, Mass. | Boston, Mass. | Amherst, Mass. | Lynn, Mass. | Ithaca, N. Y. | Twin Falls, Idaho | Albany, N. Y. | East Lansing, Mich. | Madison, Wis. | Portland, Maine | Toronto, Canada | Caribou, Maine | Summit, Mont. | Fairbanks, Alaska |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *1949* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dec. 3 | 374 | 318 | 159 | 270 | 267 | 37 | 234 | 260 | ----- | 287 | 242 | 228 | 224 | ----- | 259 | 152 | 225 | 228 | 196 | 209 | 181 | 222 | 183 | ----- | 203 | ----- | 159 | 180 | 186 | 145 | 178 | 110 | ----- |
| Dec. 4 | 503 | 462 | 275 | 281 | 120 | 198 | 122 | 171 | ----- | 283 | 227 | 268 | 187 | ----- | 71 | 251 | 233 | 67 | 227 | 217 | 157 | 199 | 170 | ----- | 124 | ----- | 82 | 221 | 194 | 36 | 204 | 135 | ----- |
| Dec. 5 | 516 | 477 | 231 | 264 | 270 | 277 | 244 | 248 | ----- | (65) | 194 | 271 | 145 | ----- | 148 | 157 | 159 | 232 | 130 | 186 | 147 | 76 | 149 | ----- | 81 | ----- | 161 | 217 | 148 | 107 | 76 | 16 | ----- |
| Dec. 6 | 455 | 445 | 204 | 266 | 189 | 199 | 131 | 238 | ----- | 173 | 195 | 78 | 109 | ----- | 223 | 233 | 202 | 117 | 189 | 163 | 147 | 185 | 151 | ----- | 139 | ----- | 56 | 23 | 206 | 162 | 113 | 112 | ----- |
| Dec. 7 | 360 | 371 | 203 | 150 | 265 | 135 | 59 | 202 | ----- | 157 | 158 | 152 | 116 | ----- | 95 | 232 | 56 | 77 | 50 | 33 | 16 | 47 | 27 | ----- | 89 | ----- | 174 | 111 | 30 | 109 | 157 | 140 | ----- |
| Dec. 8 | 216 | 177 | 73 | 54 | 237 | 172 | 259 | 195 | ----- | 218 | 221 | 194 | 58 | ----- | 143 | 83 | 229 | 118 | 223 | 225 | 212 | 154 | 198 | ----- | 184 | ----- | 116 | 223 | 163 | 170 | 127 | 150 | ----- |
| Dec. 9 | 264 | 260 | 193 | 278 | 120 | 231 | 175 | 206 | ----- | 162 | 225 | 87 | 151 | ----- | 177 | 34 | 224 | 193 | 209 | 201 | 175 | 163 | 170 | ----- | 30 | ----- | 161 | 81 | 181 | 162 | 174 | 30 | ----- |
| Means | 384 | 359 | 191 | 223 | 210 | 178 | 175 | 217 | ----- | (192) | 209 | 182 | 141 | ----- | 159 | 163 | 190 | 147 | 175 | 176 | 148 | 149 | 149 | ----- | 121 | ----- | 130 | 151 | 158 | 127 | 147 | 99 | ----- |
| Departures | −24 | −15 | −44 | −1 | +66 | −2 | +4 | +56 | ----- | −14 | ----- | −8 | −15 | ----- | +28 | −8 | +50 | +28 | +36 | +39 | +45 | ----- | ----- | ----- | −1 | ----- | +38 | +33 | ----- | +39 | ----- | +11 | ----- |
| Dec. 10 | 450 | 437 | 238 | 271 | 41 | 281 | 283 | 111 | ----- | 177 | 128 | 185 | 116 | ----- | 126 | 22 | 225 | 22 | 212 | 213 | 172 | 185 | 171 | ----- | 65 | ----- | 17 | 28 | 203 | 87 | 95 | 73 | ----- |
| Dec. 11 | 365 | 286 | 274 | 191 | 79 | 280 | 289 | 52 | ----- | 293 | 70 | 111 | 154 | ----- | 18 | 96 | 19 | 47 | 25 | 29 | 20 | 26 | 31 | ----- | 181 | ----- | 29 | 26 | 107 | 10 | 177 | 75 | ----- |
| Dec. 12 | 456 | 401 | 269 | 197 | 25 | 268 | 232 | 27 | ----- | 174 | 38 | 224 | 206 | ----- | 24 | 236 | 25 | 171 | 25 | 19 | 22 | 16 | 17 | ----- | 87 | ----- | 131 | 202 | 25 | 157 | 42 | 51 | ----- |
| Dec. 13 | 400 | 292 | 257 | 245 | 80 | 252 | 234 | 17 | ----- | 265 | 19 | 218 | 126 | ----- | 114 | 186 | 16 | 184 | 14 | 9 | 5 | 24 | 6 | ----- | 112 | ----- | 139 | 190 | 20 | 123 | 33 | 68 | ----- |
| Dec. 14 | 443 | 450 | 262 | 240 | 109 | 158 | 121 | 129 | 228 | 181 | 131 | 256 | 222 | ----- | 168 | 246 | 93 | 139 | 86 | 121 | 99 | 145 | 114 | ----- | 215 | ----- | 69 | 212 | 196 | 76 | 176 | 72 | ----- |
| Dec. 15 | 439 | 436 | 153 | 91 | 248 | 92 | 36 | 213 | 247 | 84 | 180 | 245 | 106 | ----- | 196 | 227 | 208 | 58 | 196 | 208 | 176 | 207 | 182 | ----- | 118 | ----- | 61 | 197 | 178 | 134 | 187 | 43 | ----- |
| Dec. 16 | 250 | 189 | 175 | 215 | 271 | 196 | 198 | 211 | 230 | 132 | 218 | 68 | 104 | ----- | 209 | 152 | 226 | 195 | 217 | 207 | 183 | 201 | 180 | ----- | 84 | ----- | 139 | 126 | 199 | 136 | 179 | 47 | ----- |
| Means | 400 | 356 | 233 | 207 | 122 | 218 | 199 | 108 | ----- | 186 | 112 | 186 | 148 | ----- | 122 | 166 | 116 | 117 | 111 | 115 | 97 | 115 | 101 | ----- | 123 | ----- | 84 | 140 | 132 | 103 | 127 | 61 | ----- |
| Departures | +1 | −9 | +1 | −5 | −1 | +48 | +34 | −31 | ----- | −4 | ----- | +5 | +13 | ----- | +9 | +5 | −30 | +12 | −35 | −24 | −21 | ----- | ----- | ----- | −5 | ----- | −9 | +21 | ----- | +8 | ----- | −8 | ----- |
| Dec. 17 | 244 | 227 | 260 | 112 | 54 | 90 | 98 | 204 | 53 | 50 | 219 | 197 | 66 | ----- | 163 | 201 | 203 | 162 | 191 | 186 | 149 | 168 | 134 | ----- | 33 | ----- | 153 | 160 | 129 | 115 | 65 | 30 | ----- |
| Dec. 18 | 225 | 218 | 146 | 65 | 54 | 116 | 171 | 28 | 75 | 45 | 82 | 177 | 67 | ----- | 48 | 228 | 113 | 59 | 94 | 60 | 42 | 47 | 37 | ----- | 69 | ----- | 19 | 51 | 43 | 10 | 43 | 29 | ----- |
| Dec. 19 | 484 | 461 | 152 | 111 | 106 | 227 | 276 | 84 | 184 | 220 | 88 | 139 | 46 | ----- | 57 | 40 | 48 | 42 | 37 | 68 | 65 | 104 | 66 | ----- | 126 | ----- | 36 | 39 | 138 | 41 | 58 | 131 | ----- |
| Dec. 20 | 474 | 477 | 269 | 292 | 258 | 270 | 262 | 147 | 78 | 220 | 194 | 213 | 219 | 150 | 106 | 71 | 183 | 49 | 158 | 173 | 138 | 148 | 119 | ----- | 154 | ----- | 15 | 25 | 154 | 87 | 120 | 48 | ----- |
| Dec. 21 | 485 | 451 | 245 | 238 | 181 | 249 | 255 | 116 | 15 | (280) | 126 | 175 | 78 | 93 | 110 | 38 | 170 | 41 | 148 | 67 | 52 | 69 | 40 | ----- | 117 | ----- | 10 | 27 | 58 | 10 | 19 | 56 | ----- |
| Dec. 22 | 476 | 430 | 258 | 269 | 31 | 251 | 249 | 108 | 103 | 280 | 116 | 109 | 73 | 89 | 184 | 246 | 48 | 53 | 67 | 117 | 130 | 123 | 121 | ----- | 58 | ----- | 14 | 82 | 145 | 22 | 31 | 33 | ----- |
| Dec. 23 | 487 | 467 | 245 | 270 | 173 | 244 | 242 | 37 | 257 | 276 | 20 | 188 | 170 | 26 | 21 | 214 | 58 | 43 | 50 | 49 | 47 | 19 | 57 | ----- | 128 | ----- | 88 | 180 | 47 | 82 | 9 | 51 | ----- |
| Means | 411 | 390 | 225 | 194 | 122 | 207 | 222 | 103 | 109 | 196 | 121 | 171 | 103 | 89 | 98 | 148 | 118 | 64 | 108 | 103 | 89 | 97 | 82 | ----- | 98 | ----- | 48 | 81 | 102 | 52 | 49 | 54 | ----- |
| Departures | +3 | +13 | +3 | −17 | −27 | +62 | +94 | −45 | −55 | −15 | ----- | −11 | −35 | −23 | −27 | −20 | −21 | −46 | −44 | −34 | −18 | ----- | ----- | ----- | −18 | ----- | −47 | −41 | ----- | −35 | ----- | +1 | ----- |
| Dec. 24 | 486 | 458 | ----- | 252 | 283 | 119 | 202 | 233 | 256 | 279 | 204 | 74 | 135 | 201 | 200 | 212 | 217 | 148 | 223 | 217 | 184 | 120 | 187 | ----- | 135 | ----- | 150 | 218 | 190 | 105 | 165 | 33 | ----- |
| Dec. 25 | 503 | 471 | ----- | 260 | 87 | 222 | 265 | 204 | 26 | 261 | 170 | 200 | 239 | 141 | 210 | 129 | 209 | 187 | 192 | 197 | 165 | 207 | 172 | ----- | 102 | ----- | 72 | 61 | 162 | 127 | 207 | 22 | ----- |
| Dec. 26 | 426 | 401 | ----- | 272 | 51 | 216 | 246 | 68 | 77 | 254 | 166 | 139 | ----- | 55 | 10 | 218 | 73 | 24 | 63 | 58 | 44 | 20 | 52 | ----- | 148 | ----- | 24 | 206 | 82 | 6 | 95 | 40 | ----- |
| Dec. 27 | 256 | 222 | ----- | 282 | 87 | 227 | 239 | 94 | 256 | 272 | 73 | 209 | 166 | 53 | 41 | 233 | 47 | 142 | 39 | 34 | 23 | 35 | ----- | ----- | 114 | ----- | 22 | 142 | 67 | 26 | 37 | 18 | ----- |
| Dec. 28 | 293 | 269 | ----- | 269 | 281 | 237 | 227 | 235 | 256 | 268 | 224 | 260 | 210 | 223 | 135 | 225 | 217 | 214 | 213 | 201 | 169 | 163 | 163 | ----- | 202 | ----- | 155 | 165 | 184 | 162 | 106 | 26 | ----- |
| Dec. 29 | 455 | 405 | ----- | 245 | 267 | 265 | 163 | 151 | 236 | 240 | 160 | 270 | 190 | 220 | 206 | 218 | 185 | 78 | 197 | 198 | 166 | 200 | 175 | ----- | 200 | ----- | 153 | 88 | 192 | 176 | 136 | 131 | ----- |
| Dec. 30 | 438 | 328 | ----- | 270 | 259 | 59 | 244 | 238 | 208 | 260 | 223 | 187 | 236 | 229 | 236 | 57 | 239 | 212 | 229 | 232 | 204 | 206 | 198 | ----- | 183 | ----- | 122 | 132 | 196 | 126 | 154 | 39 | ----- |
| Dec. 31 | 433 | 425 | ----- | 150 | 84 | 69 | 198 | 210 | 43 | 279 | 214 | 269 | 225 | 169 | 204 | 50 | 222 | 230 | 209 | 190 | 151 | 206 | 184 | ----- | 114 | ----- | 34 | 20 | 190 | 104 | 187 | 18 | ----- |
| Means | 411 | 372 | ----- | 250 | 175 | 177 | 223 | 179 | 170 | 264 | 179 | 201 | 200 | 162 | 155 | 168 | 176 | 154 | 170 | 166 | 138 | 145 | 162 | ----- | 150 | ----- | 91 | 129 | 158 | 104 | 136 | 41 | ----- |
| Departures | +1 | −7 | ----- | +39 | +72 | +35 | +89 | +34 | +36 | +23 | ----- | +15 | +43 | +39 | +49 | +8 | +40 | +55 | +32 | +38 | +33 | ----- | ----- | ----- | +19 | ----- | +13 | +12 | ----- | +20 | ----- | −16 | ----- |

ACCUMULATED DEPARTURES ON DECEMBER 31, 1949

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | +196 | +238 | +12,390 | ----- | +9,261 | +11,949 | ----- | −2,016 | ----- | +1,323 | ----- | ----- | −854 | ----- | +8,449 | −2,121 | +6,076 | +11,242 | +3,532 | +6,818 | +12,404 | ----- | ----- | ----- | +5,306 | ----- | −3,241 | +9,863 | ----- | +588 | ----- | +308 | ----- |

PERCENTAGE DdepartureS FOR THE YEAR 1949

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | +0.1 | +0.1 | −8.2 | ----- | +7.5 | +7.2 | ----- | −1.6 | ----- | +0.8 | ----- | ----- | −0.6 | ----- | +7.3 | −1.6 | +4.8 | +9.2 | +2.9 | +5.5 | +11.6 | ----- | ----- | ----- | +3.8 | ----- | −3.2 | +8.2 | ----- | +0.5 | ----- | +0.3 | ----- |

NOTE.—Values in parentheses are interpolated.

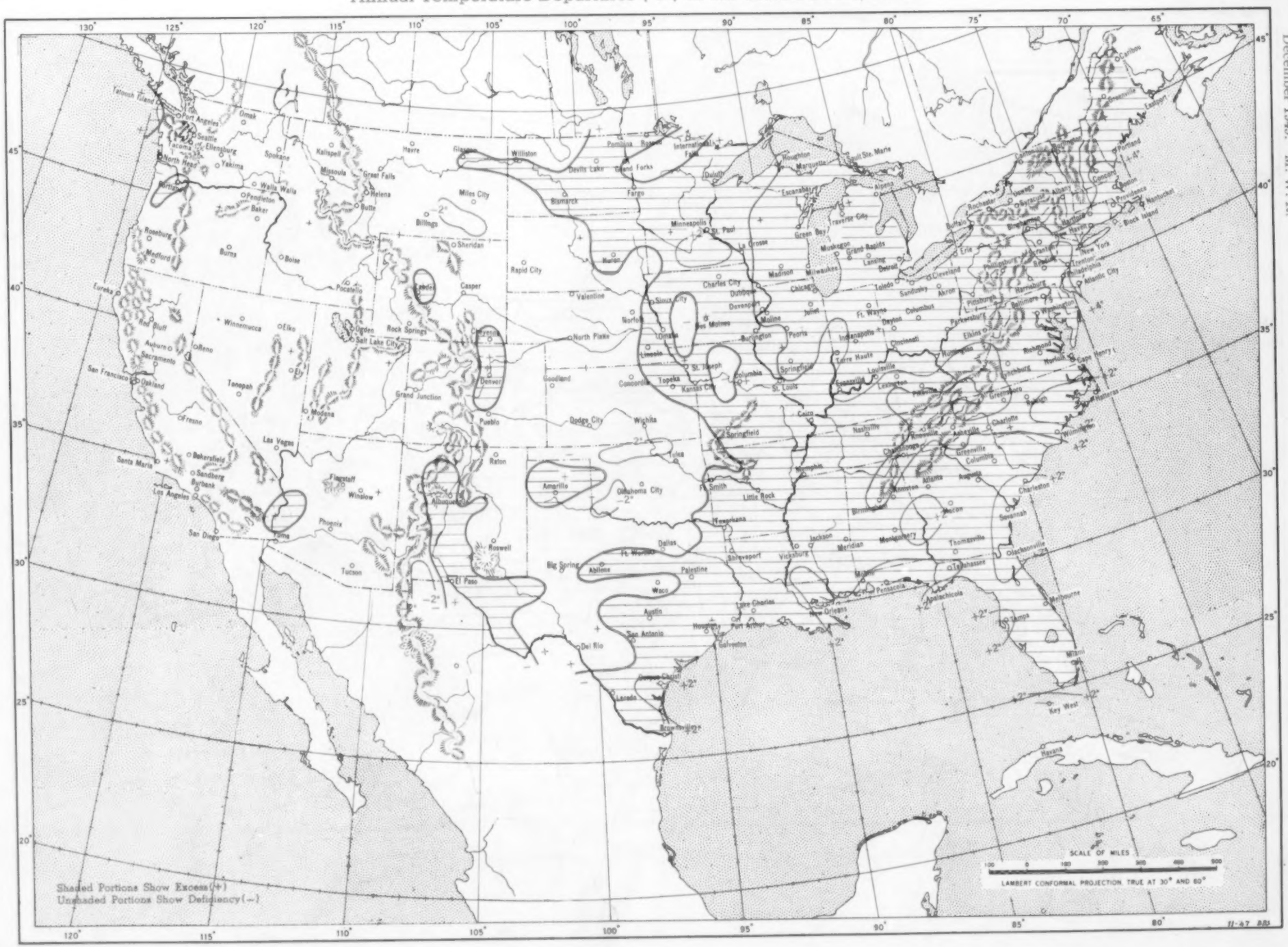
TABLE 3.—*Daily totals and weekly means of solar and sky radiation, plus the radiation reflected from the ground, as received on a vertical surface facing south at Blue Hill, Mass., during December 1949*

| Date | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Mean | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gm cal cm$^{-2}$ | 456 | 473 | 355 | 359 | 26 | 530 | 452 | 379 | 508 | 16 | 12 | 6 | 158 | 511 | 524 | 248 | 381 | 36 | 62 | 351 | 48 | 178 | 59 | 159 |
| Date | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Mean | | | | | | | | | | | | | | | |
| Gm cal cm$^{-2}$ | 536 | 457 | 34 | 17 | 476 | 452 | 582 | 453 | 376 | | | | | | | | | | | | | | | |

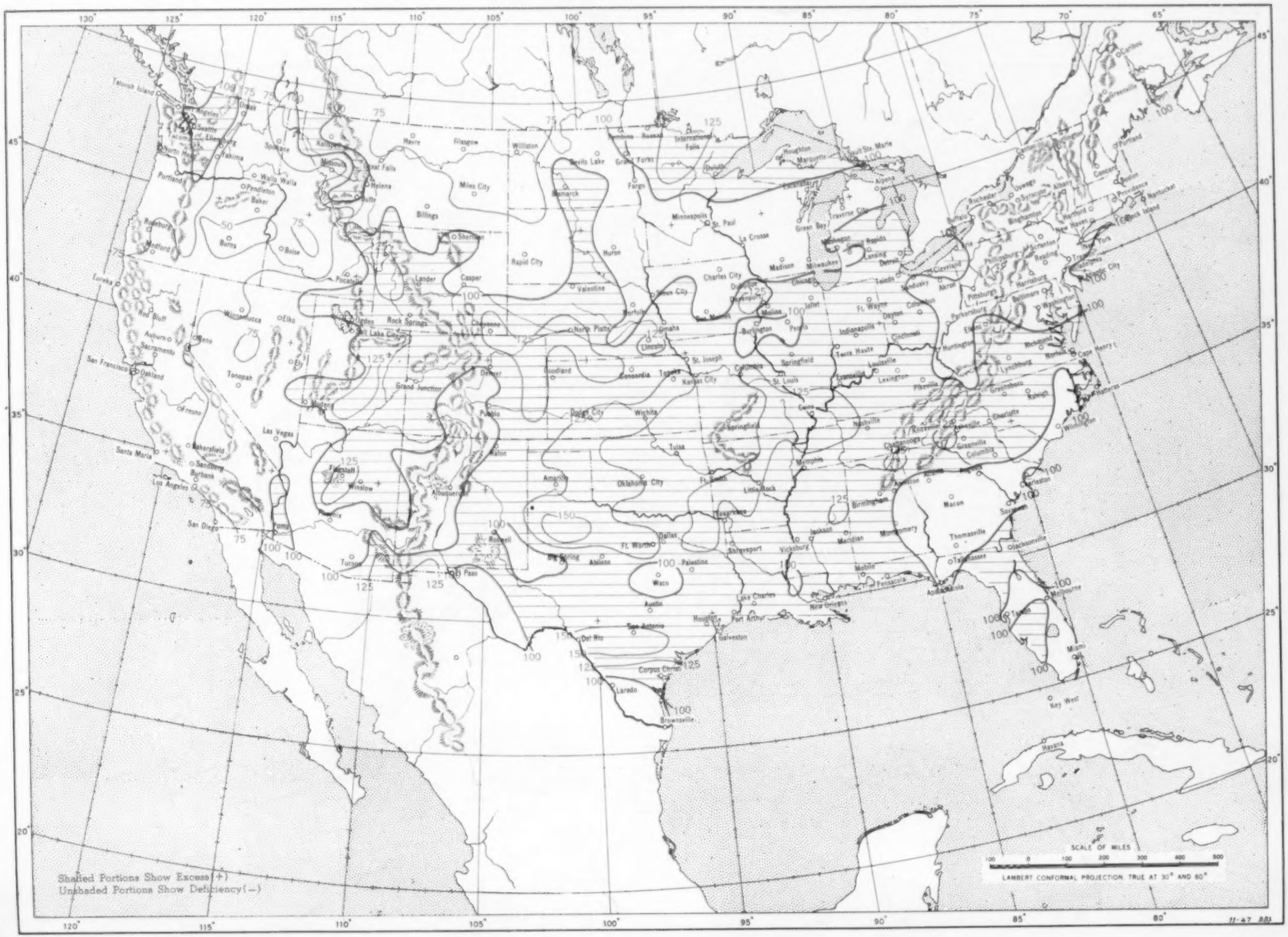
TABLE 4.—*Daily totals and weekly means of solar and sky radiation, plus the radiation reflected from the ground, as received on a vertical surface facing north at Blue Hill, Mass., during December 1949*

| Date | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Mean | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gm cal cm$^{-2}$ | 48 | 54 | 44 | 47 | 19 | 48 | 43 | 43 | 44 | 12 | 7 | 3 | 31 | 29 | 30 | 22 | 40 | 23 | 25 | 34 | 26 | 30 | 14 | 28 |
| Date | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Mean | | | | | | | | | | | | | | | |
| Gm cal cm$^{-2}$ | 32 | 30 | 21 | 15 | 33 | 33 | 35 | 27 | 28 | | | | | | | | | | | | | | | |

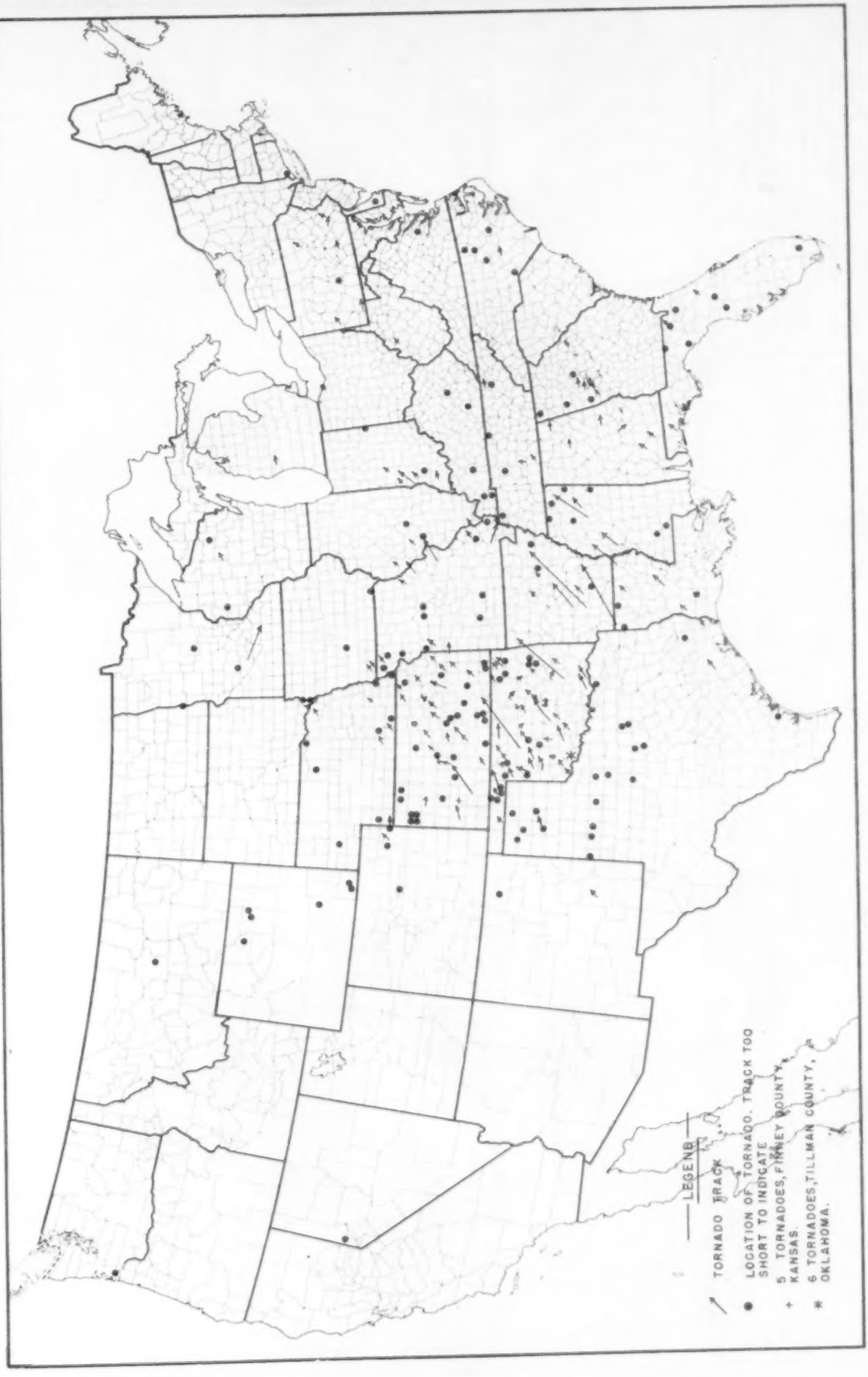
## Annual Temperature Departures (°F.) in the United States, 1949



# Percentage of Normal Annual Precipitation in the United States, 1949



Tracks of Tornadoes during 1949




Dots show location of tornadoes where tracks are too short to indicate on chart.

Tracks of North Atlantic Hurricanes and Tropical Disturbances of 1949

## Tracks of North Atlantic Hurricanes and Tropical Disturbances of 1949

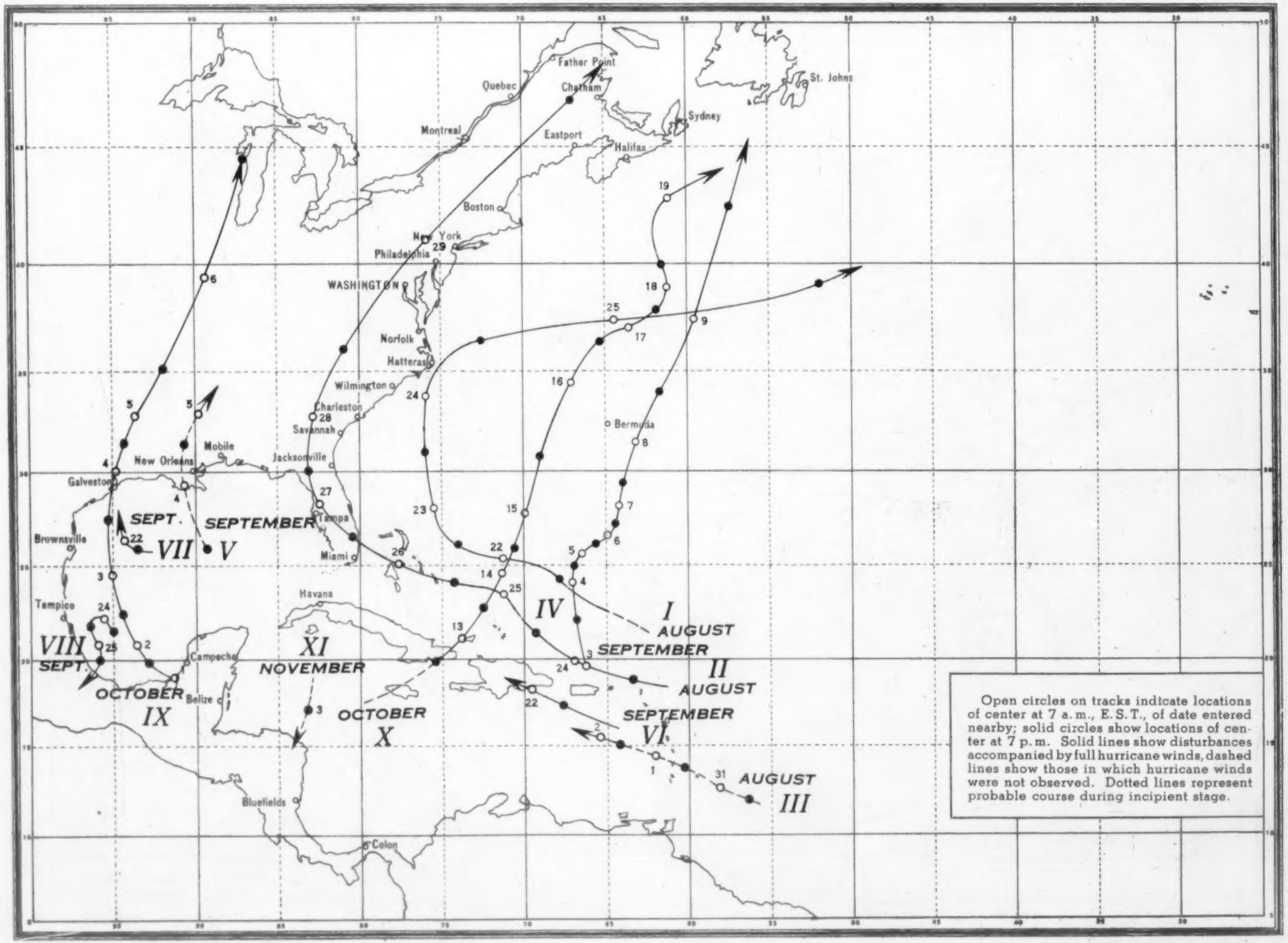


Chart I.—Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, December 1949

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, December 1949

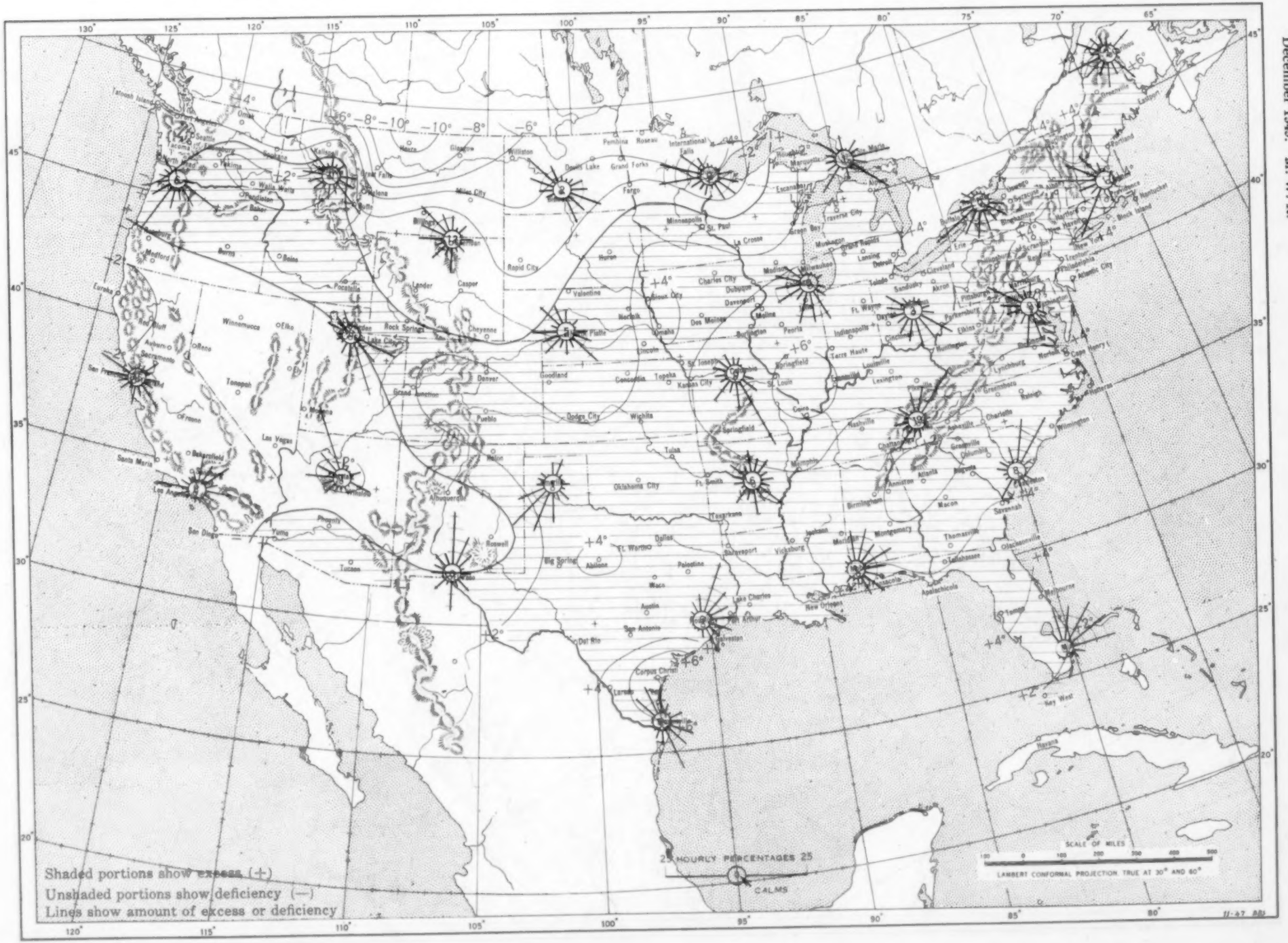
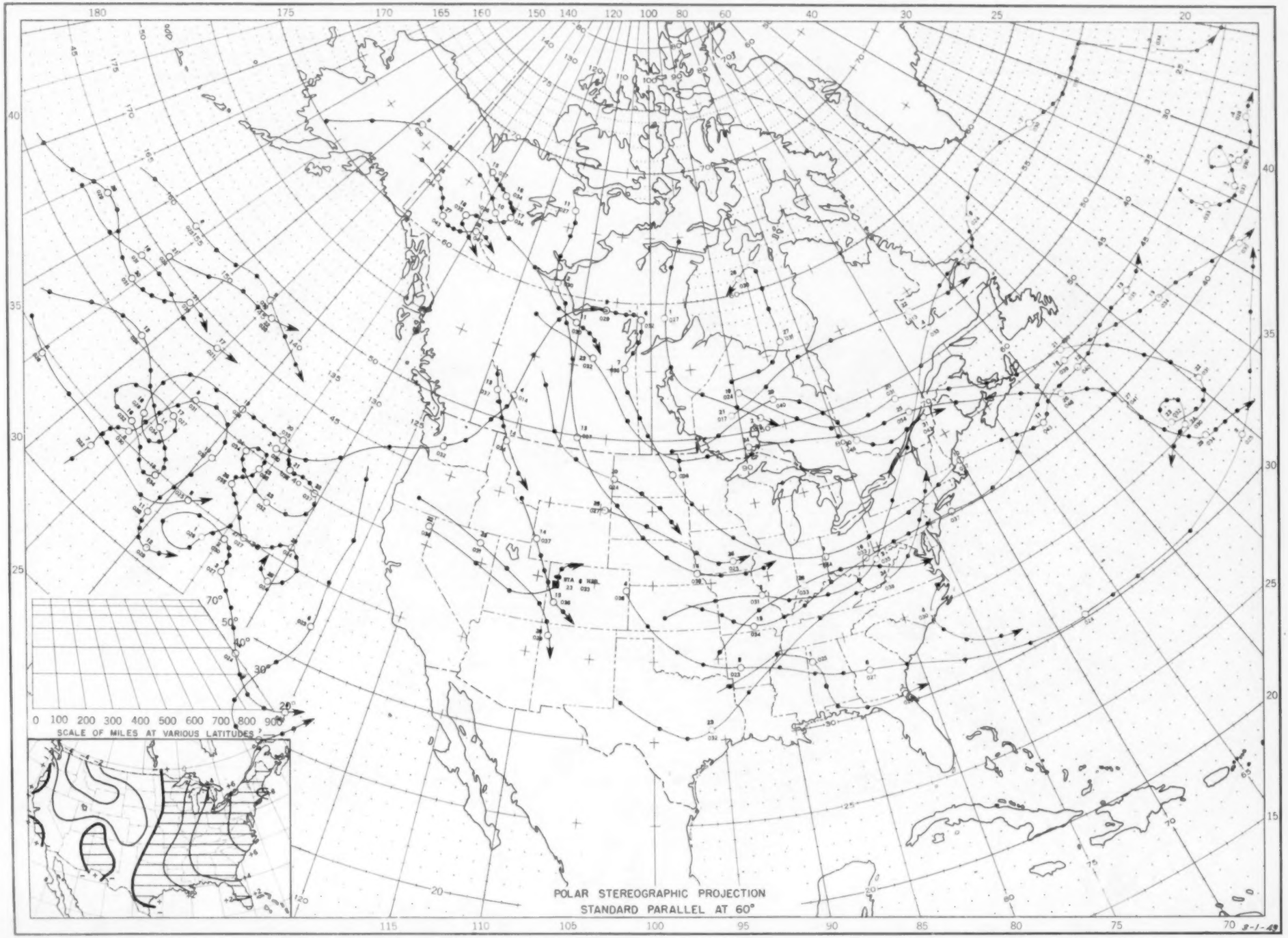


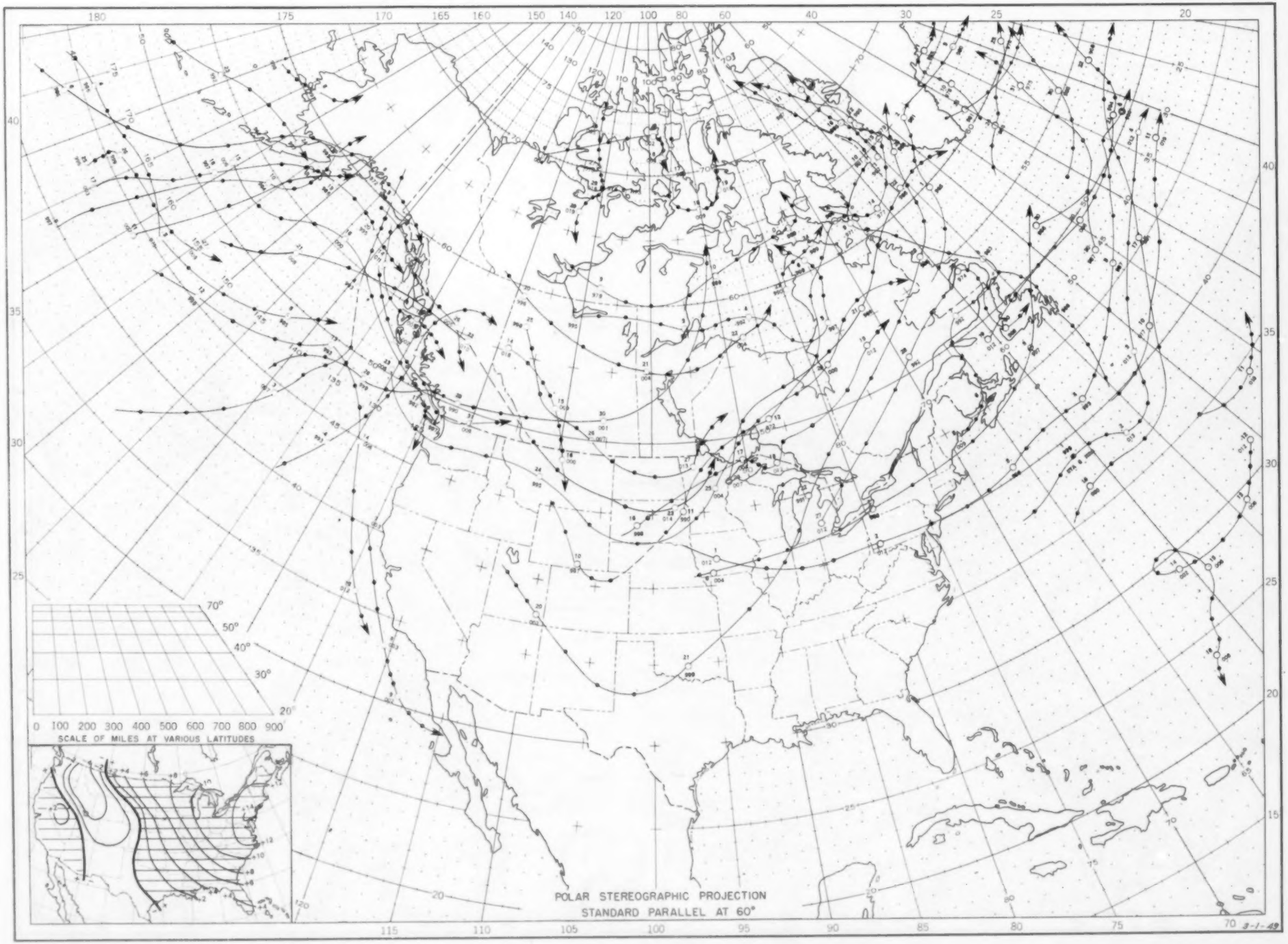
Chart II. Tracks of Centers of Anticyclones, December 1949. (Inset) Departure of Monthly Mean Pressure from Normal




Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time). Dots indicate intervening 6-hourly positions. Figure above circle indicates date, and figure below, pressure to nearest millibar. Only those centers which could be identified for 24 hours or more are included.

below, pressure to nearest millibar. Only those centers which could be identified for 24 hours or more are included.

Chart III. Tracks of Centers of Cyclones, December 1949. (Inset) Change in Mean Pressure from Preceding Month




Circle indicates position of cyclone at 7:30 a. m. (75th meridian time) Dots indicate intervening 6-hourly positions. Figure above circle indicates date, and figure below, pressure to nearest millibar. Only those centers which could be identified for 24 hours or more are included.

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, December 1949

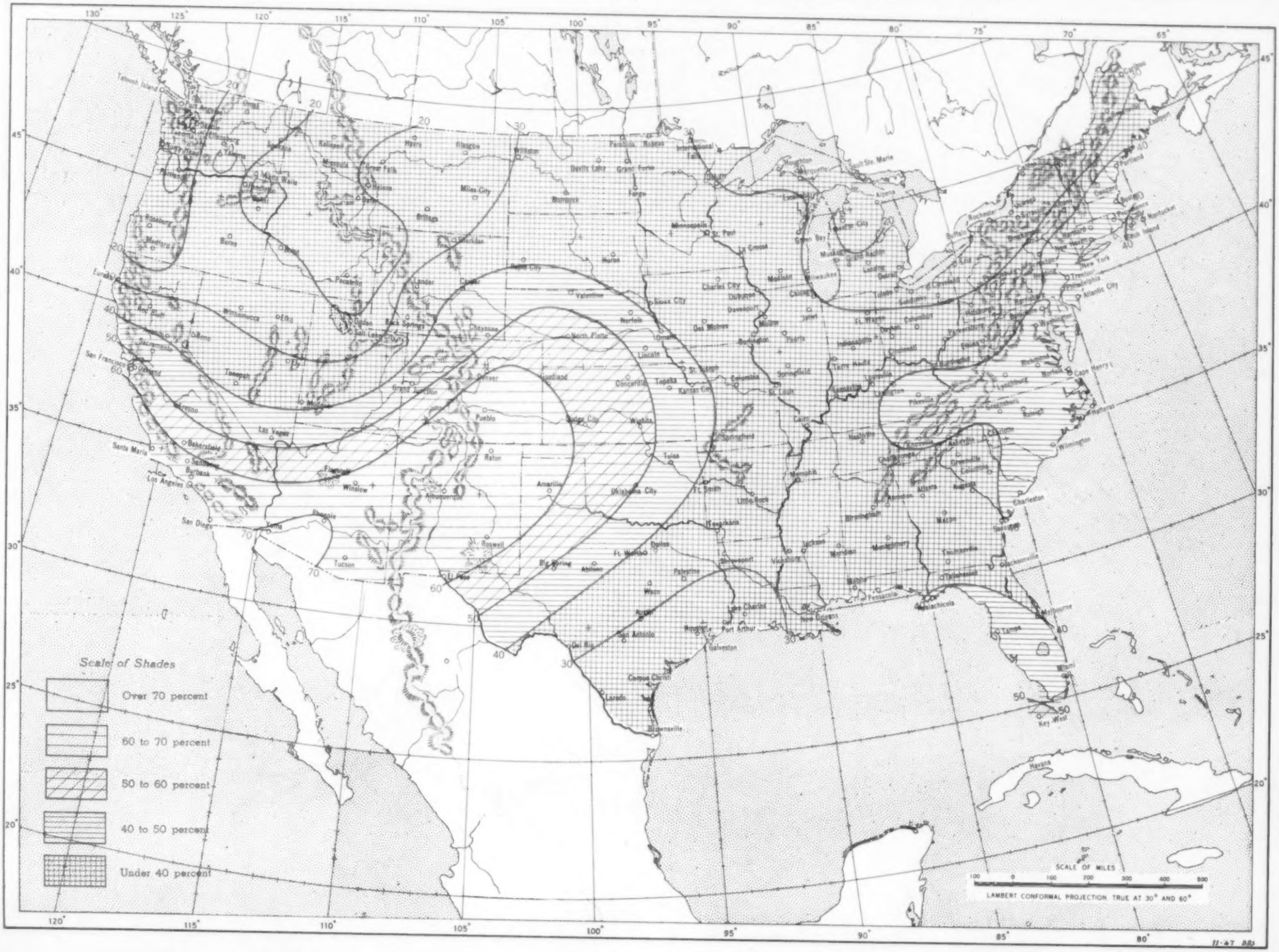



Chart V. Total Precipitation, Inches, December 1949 (Inset) Departure of Precipitation from Normal

Chart V. Total Precipitation, Inches, December 1949. (Inset) Departure of Precipitation from Normal

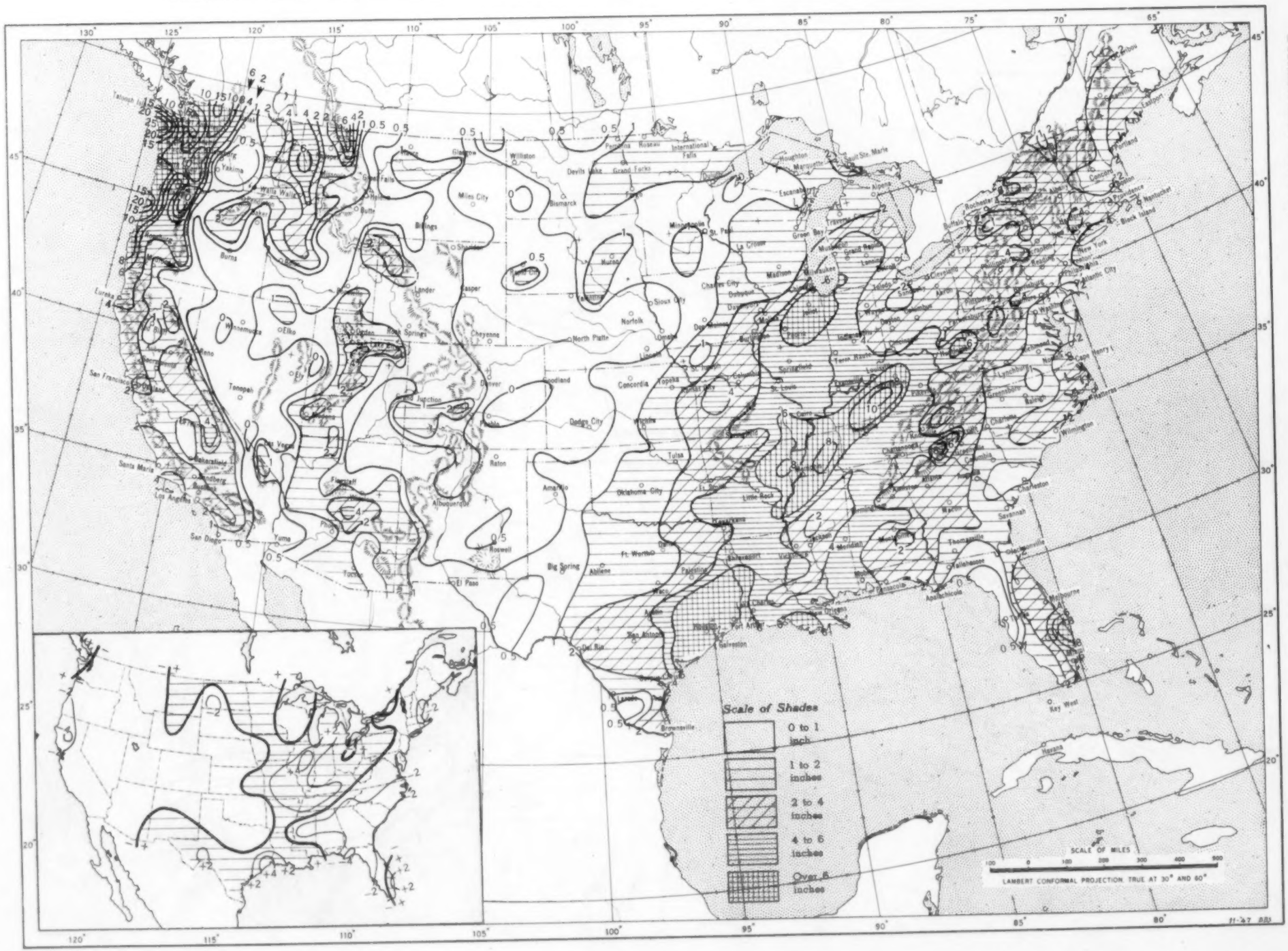
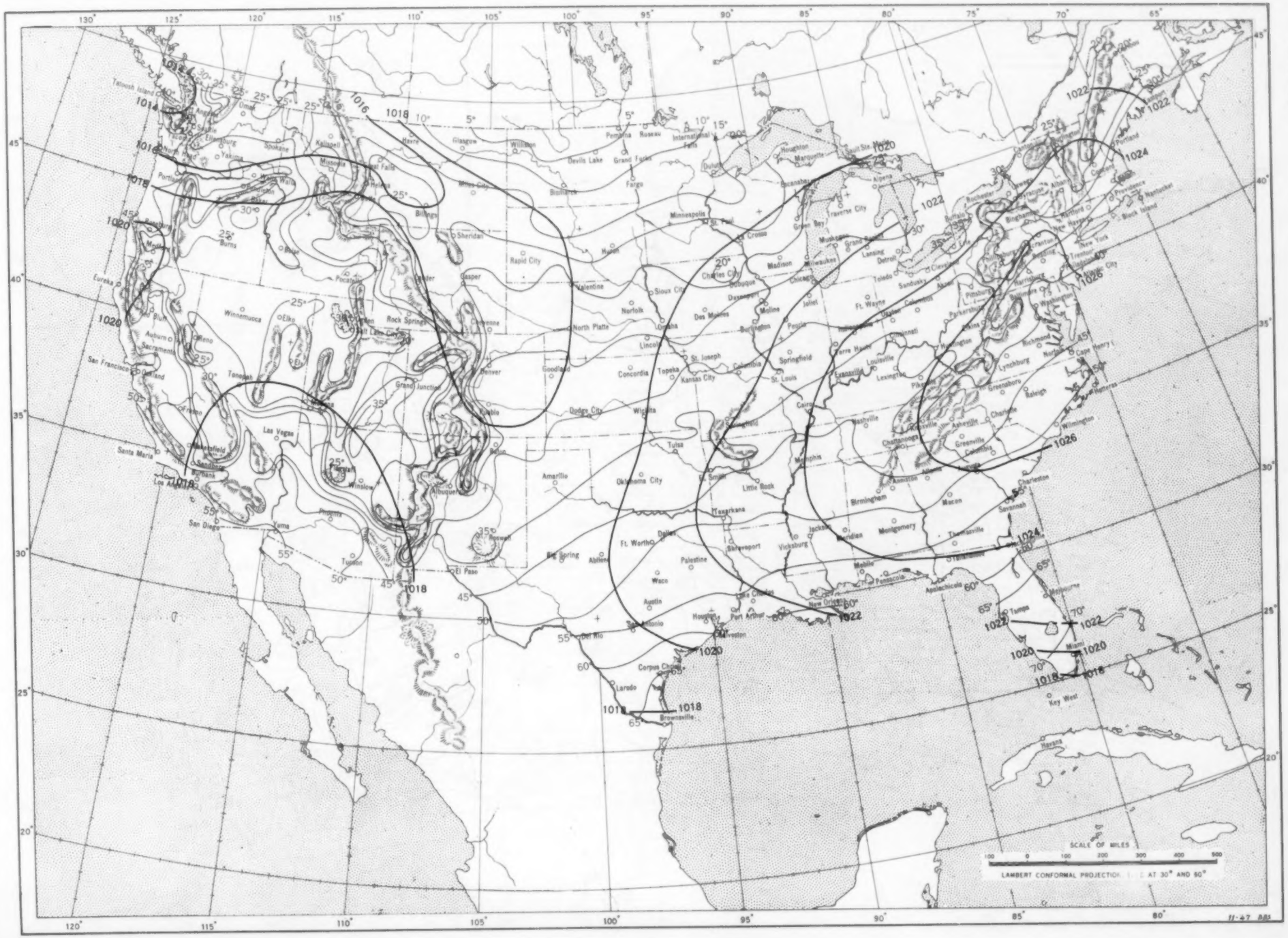


Chart VI. Mean Isobars (mb.) at Sea Level and Mean Isotherms (°F.) at Surface., December 1949






Total Snowfall, Inches, December 1949 (Inset) Depth of Snow on the Ground at 7:30 a. m., December 27, 1949

Chart VII. Total Snowfall, Inches, December 1949. (Inset) Depth of Snow on the Ground at 7:30 a. m., December 27, 1949

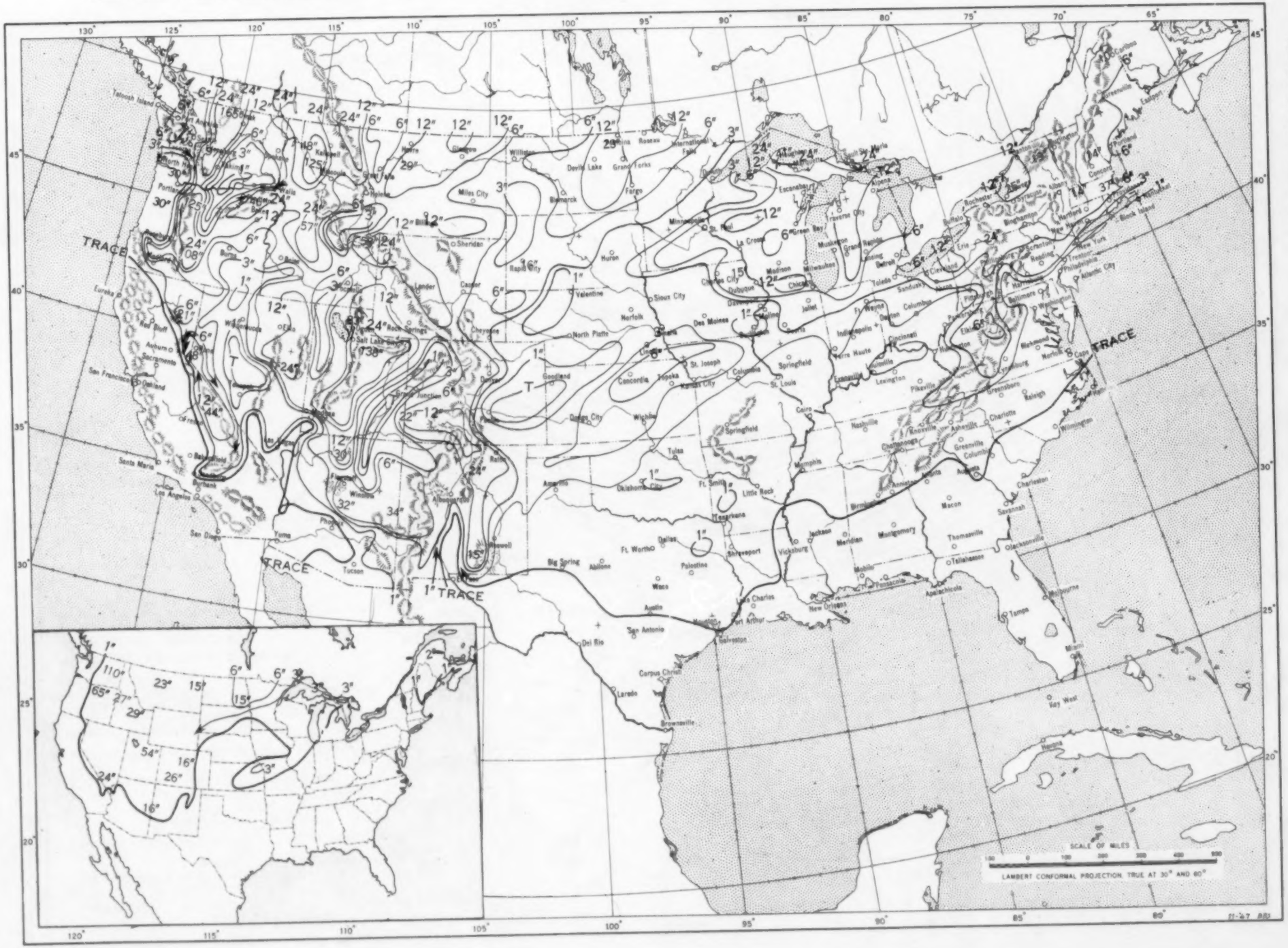
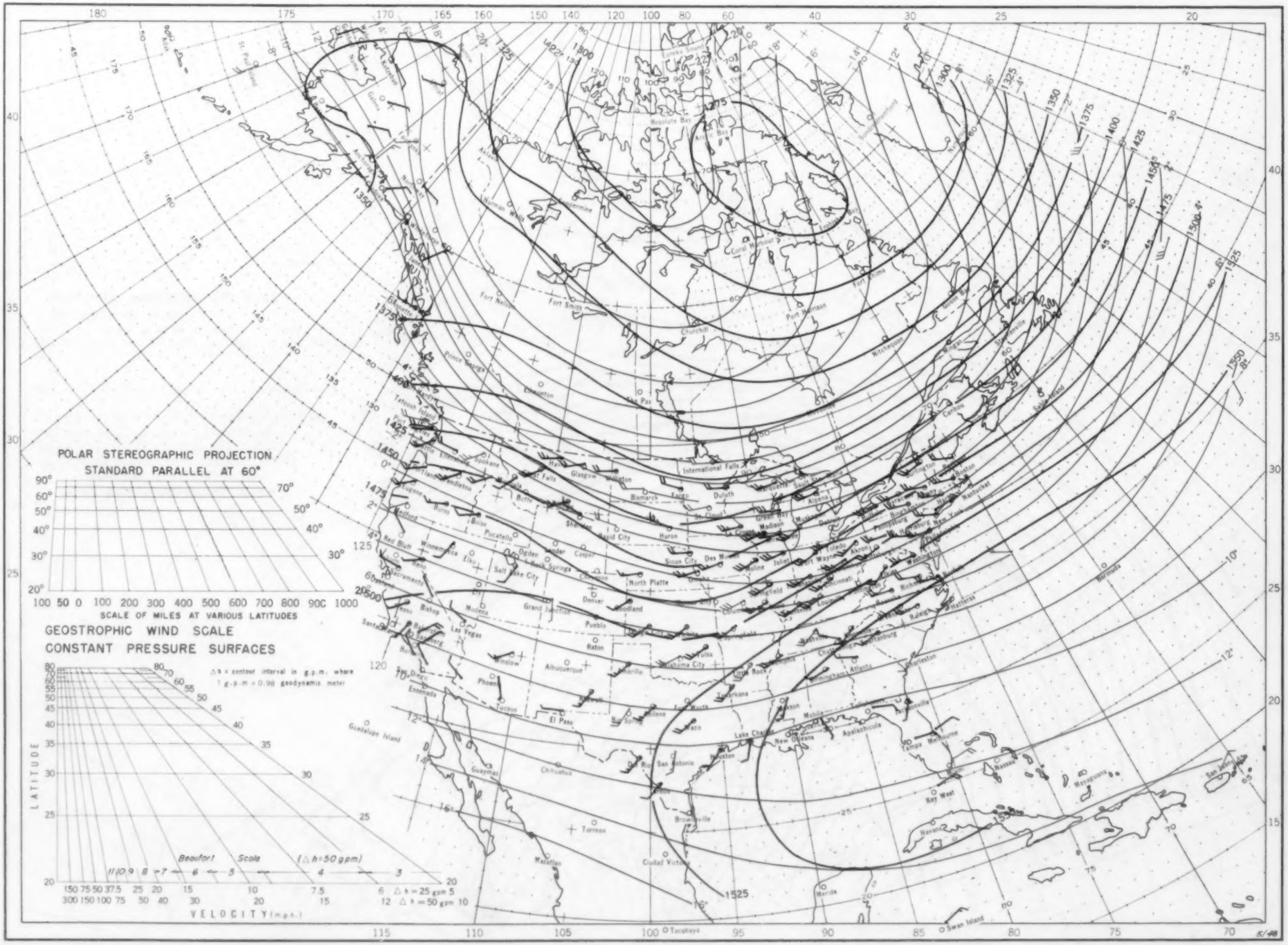


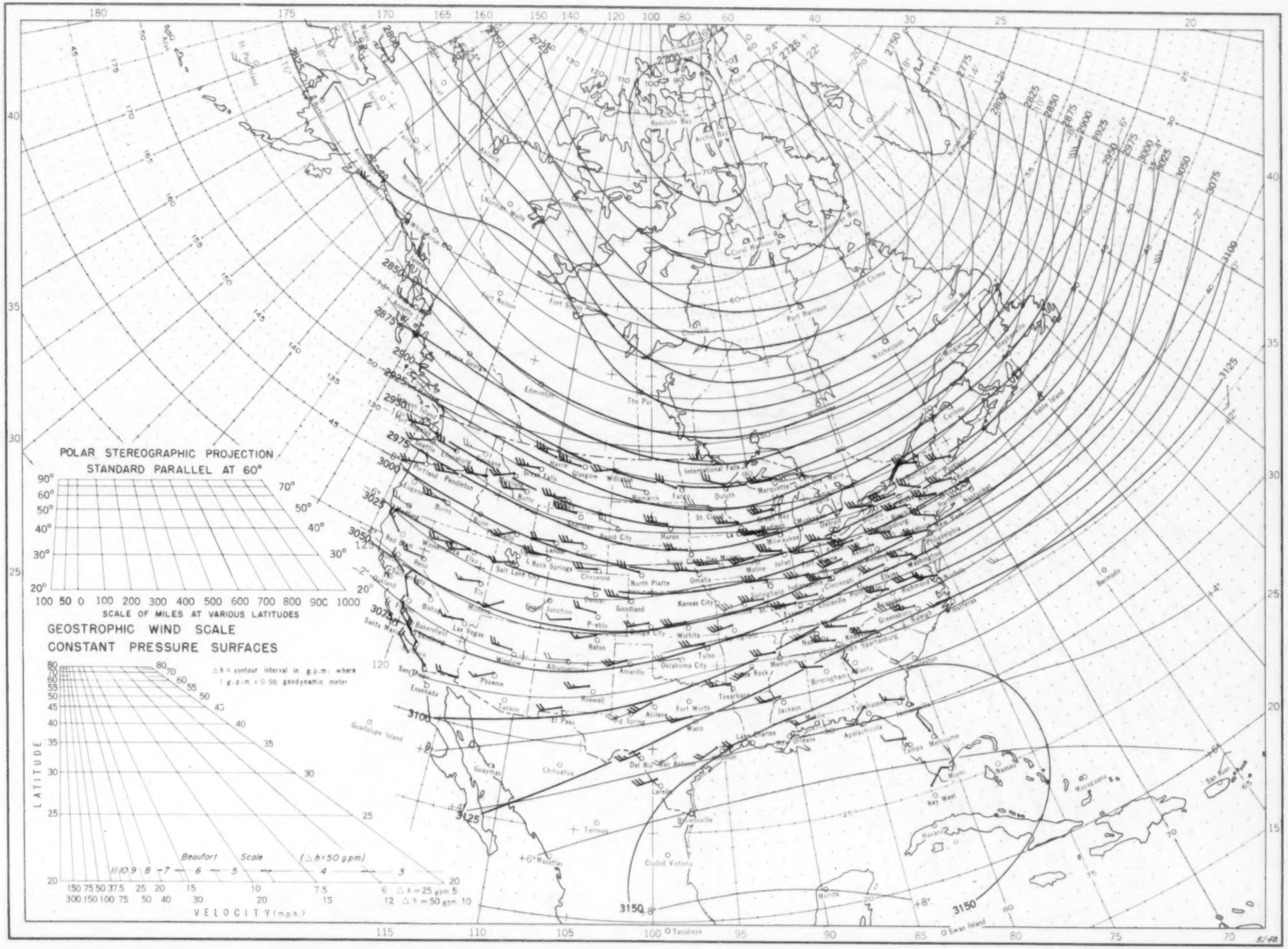
Chart VIII, December 1949. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 850-millibar Pressure Surface, and Resultant Winds at 1,500 Meters (m. s. l.)

**Chart VIII, December 1949. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 850-millibar Pressure Surface, and Resultant Winds at 1,500 Meters (m. s. l.)**




Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart IX, December 1949. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 700-millibar Pressure Surface, and Resultant Winds at 3,000 Meters (m. s. l.)

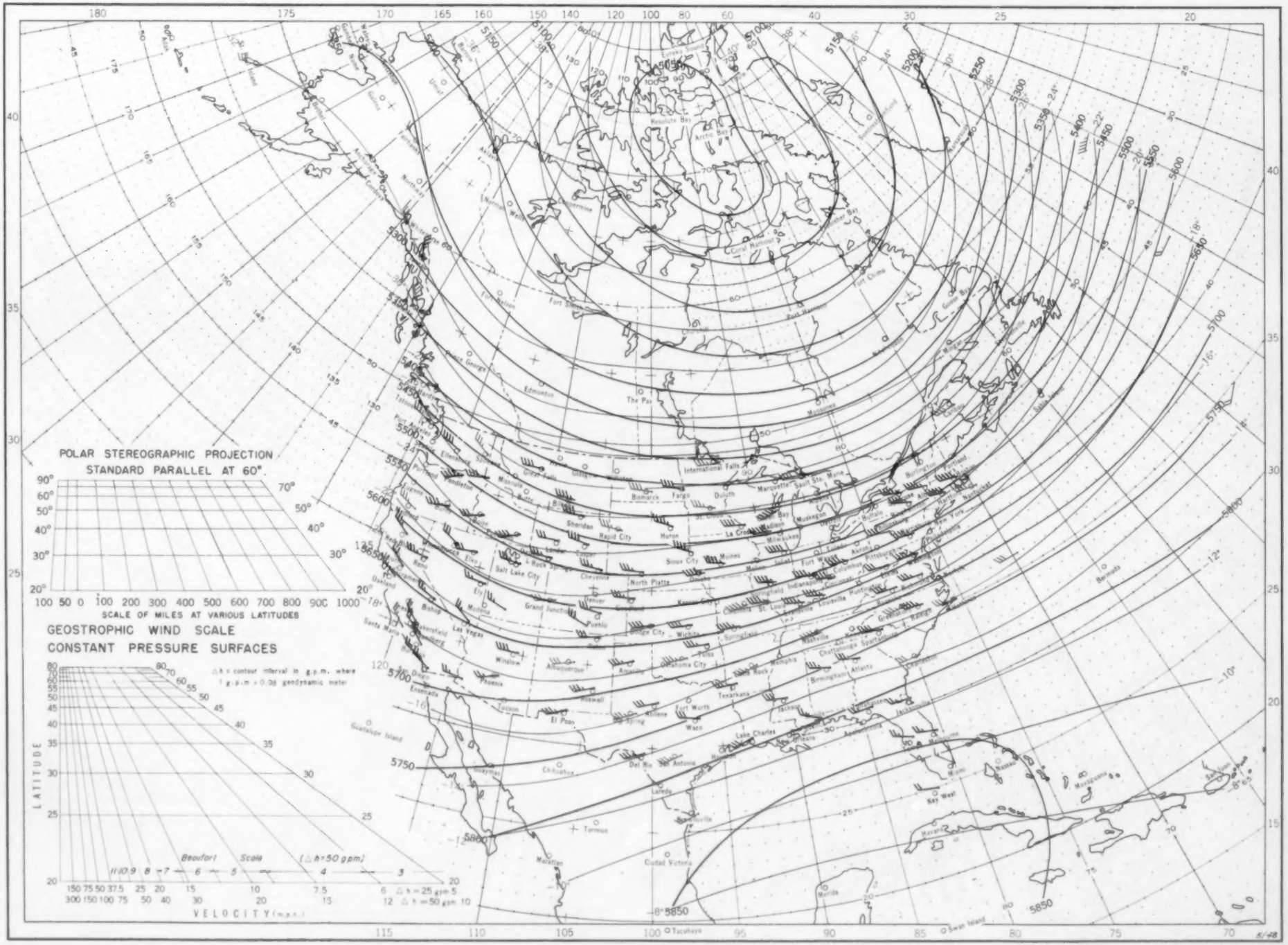



Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart X, December 1949. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 500-millibar Pressure Surface, and Resultant Winds at 5,000 Meters (m. s. l.)

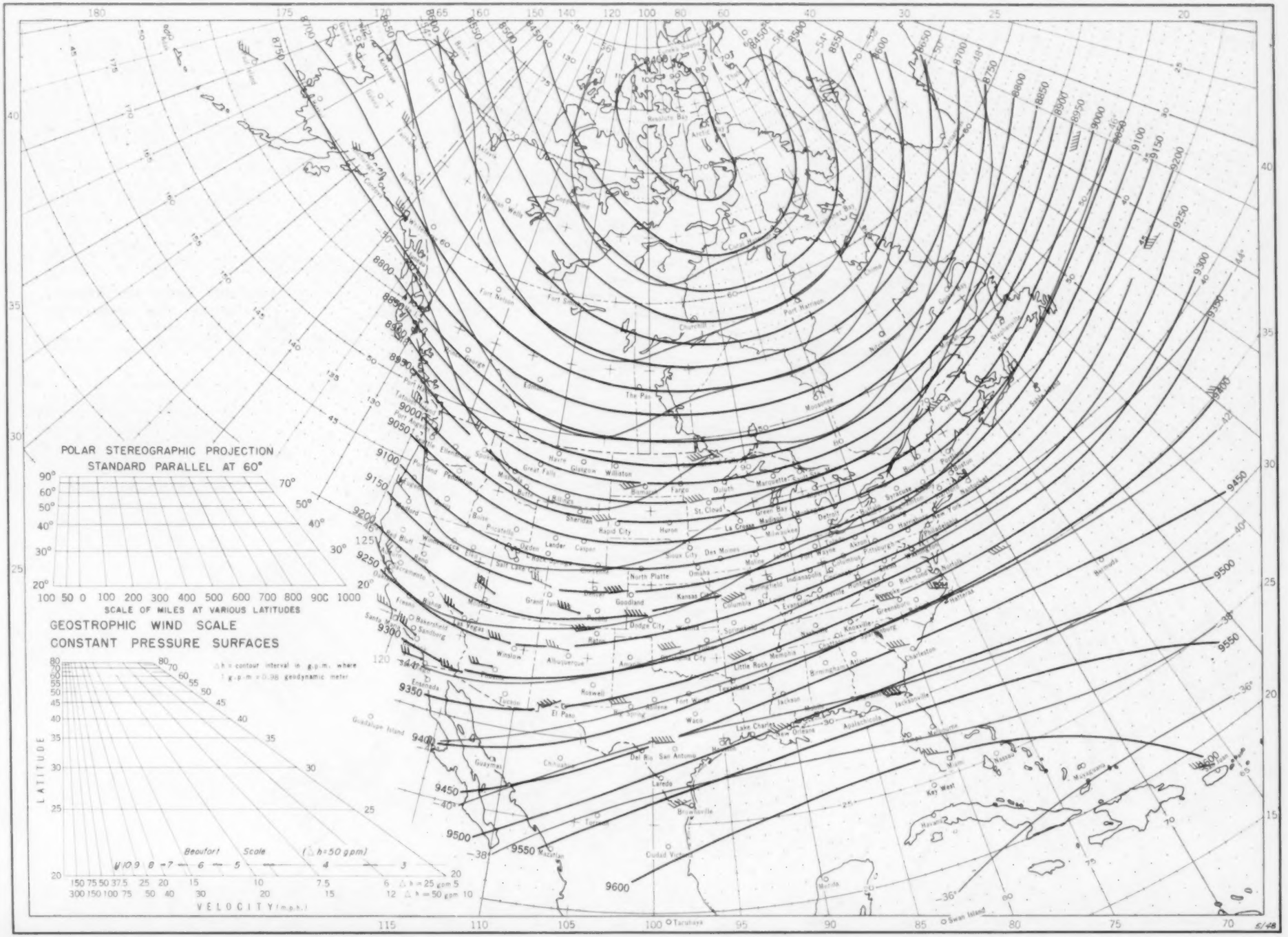
those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart X, December 1949. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 500-millibar Pressure Surface, and Resultant Winds at 5,000 Meters (m. s. l.)




Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart XI, December 1949. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 300-millibar Pressure Surface, and Resultant Winds at 10,000 Meters (m. s. l.)




Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

those indicated by red arrows based on rawins taken at 0300 G. C. T.

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The printing of this publication has been approved by the Director of the Budget. Date of approval, February 4, 1949.